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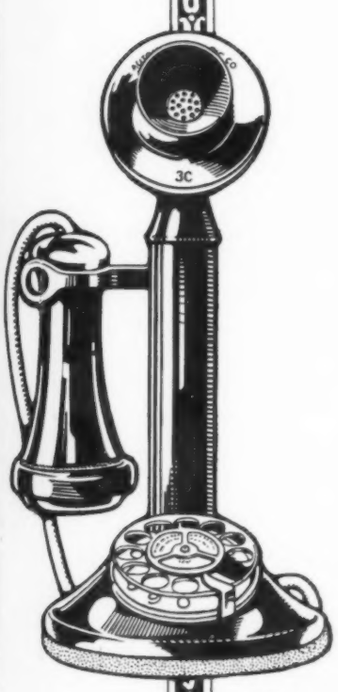
TELEPHONE ENGINEER

VOLUME 27 DECEMBER, 1923 Number 12



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CHICAGO, ILL.
Tel. Harrison 4000

TELEPHONE ENGINEER

EASTERN OFFICES:
56 W. 45TH ST.
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Tel. Vanderbilt 3695

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SOME FACTORS IN THE GROWTH OF SMALLER CITIES

The rapid extension of power transmission lines in many parts of the country has been a matter of concern to telephone companies. Most of them have realized that the power transmission line is sure to come or if it is already here, has come to stay, and they have been endeavoring to adjust their relations with the power companies so that the rights and opportunities of each may be interfered with as little as possible. They recognize the fact that the small, inefficient, isolated plant must give way to the large centrally located power station and transmission line wherever power can be delivered to the consumer more cheaply by the latter system. This will be an inevitable step in the industrial development of the country.

This leads to comment upon another interesting change that seems to be taking place in industry. This is the decentralization of the manufacturing industries to which the development of large power systems is, among many others, one of the contributing factors. There is a constantly growing tendency for factories to seek locations in smaller cities rather than to remain in the large centers. Immigration restrictions have already produced a shortage of labor in some of the industries and more and more must they depend upon the surplus population of the agricultural districts which can not profitably be employed on the farms. Either the surplus population must move to the factory city or the factory must move to the smaller town where labor is available.

This supply of labor and the development of factory processes in which semi-skilled labor can be employed at full production capacity after a very short training period has already caused the location of many small manufacturing plants in country towns of a few thousand population. Some of the larger manufacturing enterprises even have found it profitable to establish branch factories in such locations for the manufacture of smaller items or accessories. Among those which might be mentioned are small electric motors, electric lamps, shoes, automobile parts and accessories.

This tendency in industry is likely to make or cause a decided change in the character of many of the smaller cities within the next few years. Only a few years ago, a telephone engineer gave its location near a large manufacturing city as one of the reasons for a conservative estimate of growth of population in a town of five thousand inhabitants. Now it seems that this fact of its location is likely to become a factor to increase the growth of the small city on account of overflow of manufacturing from the larger center. This tendency of a shift of manufacturing to the smaller cities will be watched with great interest by those whose business is located in such places as it may become a factor of much importance in the development of the business.

"PASS THE HAT" FINANCING OF TELEPHONE ASSOCIATIONS

In an editorial on the need of a general staff in the Independent telephone field, which appeared in these columns a short time ago, the method of financing telephone associations was referred to as being of the "pass the hat" kind. This method of financing is actually in use in the case of some district telephone associations. When the district meeting is held at some central point, at a certain time during the proceeding the hat is passed and each one present drops in his contribution. These small contributions are sufficient to cover the cost of postage and printing of notices that ordinarily form the bulk of the expenses of the meeting.

Although carried out in perhaps a more dignified manner, it is a fact that the financing of some of the state associations is done in almost as haphazard a way. Even the United States Independent Telephone Association, which is the national representative of over one-third of the telephone industry, depends in a large measure for its financial support upon more or less voluntary contributions. Secretary Deering's report at the recent convention shows that while 847 telephone companies are members of the national association, the major part of its resources are derived from contributions of 332 telephone companies and 37 manufacturers.

Association officers are not to be blamed for this condition. As officials of voluntary organizations they can not collect more than the association members are willing to pay. On account of the intangible character of the services rendered by the associations, telephone companies frequently place too low an appraisement on the value of these services. Often they regard the payment of money toward association activities as a kind of a charitable contribution which they may give or withhold

as they choose, rather than as a payment for services that have been received.

The companies that have been contributing faithfully for many years know that they are receiving full value in return. They will continue to contribute and associations will continue to exist and to perform such services as they can with the limited resources available. They can never, however, realize their full possibilities as service organizations until every telephone company contributes in proportion to its share of the cost of the service—and this will be something more than dropping a little loose change into the hat when it is passed.

THE KANSAS RATE CASE DECISION

The decision of the Supreme Court of Kansas in which the court ruled against the Kansas Public Utilities Commission in the rates case of the Southwestern Bell Telephone Company involving rates in seven cities, has caused a considerable amount of comment in the telephone field. While the court overruled the commission on several points involving investment of plant and operating expenses, the principal interest in the decision lies in the statements made concerning the position of the commission in judging a rate case.

In the opinion of the court, the statement is made that the commission under the law is made the protector of the public and therefore it comes into any rate investigation as a partisan and judges its own case. It is not always possible for it to weigh correctly the evidence of one of its employes against the witness for a public utility. When the matter comes into court the position is different and hence court decisions may be widely different from those of commissions.

This decision will probably put to an end some of the practices of the Kansas Commission which have been regarded as oppressive by the utilities. Many of the decisions of the commission seem to have been dictated by a desire to please the public rather than by a desire to be fair to the utility. Whether this may have been due to the way in which the law establishing the commission is written or due to the interpretation of the law by the commission itself is for Kansas to decide and to correct by amending the law or selecting commissioners that will interpret it correctly. In a majority of states the commission plan of regulation is working satisfactorily and the trouble here seems to be local to Kansas.

A HOLIDAY GREETING

To all of its friends of other years and to the many new friends made during the year just ending, TELEPHONE ENGINEER extends the greetings of the season. May they find on Christmas day, that peace which was promised by the angels to men of good will, and may 1924 bring them a full measure of health, prosperity and happiness.

PUBLICITY FOR THE CODE OF ETHICS

Many telephone companies are taking advantage of the opportunity to give publicity to the code of ethics adopted at the recent convention of the United States Independent Telephone Association. The declarations governing the relations of the telephone company with the various bodies and individuals with whom it deals are so concise, clear and manifestly just that they should appeal to every fair-minded man. Each paragraph might well be made the text of an advertisement and the publication of a series of advertisements based upon them must certainly result in an improvement of relations with the employes of the company and with the public. There would seem to be no more effective means of creating good will.

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General Business and Editorial Offices, 28 E. Jackson Blvd., Chicago, U. S. A. Telephone: Harrison 4000.
W. H. Graffis.....Gen. Mgr.
R. V. Achatz.....Technical Editor
Chas. W. McKay.....Associate Editor
Herbert Graffis.....Bus. Mgr.
Jos. M. Graffis.....Advertising Mgr.
G. W. Sutton.....Eastern Mgr.
56 W. 45th Street, New York
Tel. Vanderbilt 3695

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A WORD FOR THE OPERATORS

If there is any season of the year in which extraordinary consideration should be shown to the telephone operators, both by the telephone management and by the public generally, it is during the December peak of traffic. A word of encouragement and appreciation will do much to make things more pleasant in these days when they are working at top speed to meet the demands for service.

ENGINEERING DATA

In our "Line and Desk" department, a staff writer has compiled in tabular form the results of operation of company automobiles by the Indiana Bell Telephone Company. This company publishes monthly in its employee's magazine, the number of miles per gallon of gasoline obtained on each of the cars driven by the employees of the company. Averages are computed for the various divisions of the company territory and for the entire state.

We are calling attention to this, as we believe that the compilation and publication of such data is valuable in giving those responsible for results an opportunity for comparison with the results obtained by others. No doubt, other companies have similar data that they would gladly see made available.

Trouble and the Subscriber

The Trouble Department May Be Made a Powerful Agent in Obtaining Good Will of the Subscriber —Some Suggestions as to How It May Be Done

By C. W. KUGELMAN
Plant Superintendent, Portsmouth (O.) Telephone Company

The trouble department of the telephone company is one of the most important parts of the organization. It is really the medical treatment part of the organization and as such should be composed of employes who put service and courtesy first.

Just as a physician should be prompt and courteous in his treatment of his patients, so should those who are connected with the trouble department be prompt and courteous in their treatment of subscribers and those with whom they are in daily contact. The troubleman is the one who comes into most direct contact with the subscriber and his actions go a long way towards creating a kindly feeling of the subscriber towards the company.

The Wire Chief Is Generalissimo of the Trouble Forces

Before dealing with the troubleman we should first consider the head of the department, the wire chief. A good wire chief is one who is deeply interested in his work and is ready to respond day or night should occasion require. While always ready, in a courteous way, to defend his company against unfair accusations of neglect he should at the same time see the argument from the subscriber's side. He should do all in his power to give the subscriber good service. Service is all he has to sell, therefore it should be a good article.

Many times a subscriber will not believe he is receiving just treatment and will call up or come to the exchange in a very bad humor. If the wire chief can convince him that everything possible is being done to rectify the trouble and if he can get a smile in place of a scowl he has made a friend for both himself and his company. The subscriber should be persuaded to come to the office in order that he may see the intricate system of wires and apparatus which have to be kept constantly in tune in order to give good service. How to use a telephone in the proper manner should be explained. Many people do not know that a few inches away from the transmitter makes a great difference in transmission but can easily understand if shown the action of the carbon granules and the electrodes of the transmitter. Many a chronic kicker can be turned into a friend by a visit to the plant, where he meets and converses with the people who handle complaints.

In many exchanges the wire chief has to take care of all apparatus in addition to testing and supervising the clearing of trouble. He should never leave the plant for the night—especially if he does not work on Sundays—with any line out of service that could be given service by his staying a few minutes overtime. In fact, a good wire chief pays little attention to the clock when there is work that should be attended to. He should be the first man on the job and the last one to leave and should always know the condition of his trouble, keeping it down in every way possible. For paying strict attention to his job his company should reward him not only in the pay envelope but by allowing him time off occasionally in addition to a regular vacation once a year.

Outside Plant Experience Necessary for Good Wire Chief

The wire chief on the local plant should, as a rule, be one who has been promoted from the ranks of those who have had experience as troublemen or linemen, as he then can better appreciate what a troubleman is up against. The man who has always worked inside does not know from experience the many problems a troubleman has to work out, nor does he realize how easy it is for lines or cables to be somewhat different than records show. Everyone knows that records should be complete, but sometimes minor changes which appear insignificant at the time will be made and later cause misunderstandings.

Some years ago a troubleman was sent out in the rain to clear an important line. The line was supposed to be located in a certain multiple tapped can. The troubleman found the line in a different can but on the same conductors as shown in the records. Upon pulling the fuses the trouble showed in the cable. The wire chief informed the troubleman that he was in the wrong can and the trouble was not in the cable. They got into an argument as the wire chief was the type of man who never admitted making mistakes, although otherwise a fine fellow. Before the argument ended and matters were cleared up the troubleman was soaking wet and ready to fight. It was some time before those men were good friends again; all because one would not admit that the other fellow was right.

Many incidents similar to this one can be called to mind, most of them due to a minor change being made and the records not changed. We are all liable to make mistakes and should not take a positive stand unless we are dead sure and can show we are right. Even then it pays to take a conciliatory attitude. Furthermore, public arguments between employes give the subscriber a wrong impression of the company. A good wire chief will always be considerate of the conditions under which those in his charge are working and will do everything in his power to make the work as easy as possible.

In large offices where the wire chief has to have assistants, those persons should have enough authority to keep things running smoothly. As a rule, one person only should be in direct charge of the troublemen. The writer can recall managers who interfered more or less in the work of troublemen by telling them instead of the wire chief about certain cases of trouble and directing them to be cleared at once, when the wire chief had already directed that other cases of equal importance be cleared at once. Orders of managers should be respected above those of any other persons but their orders should be given to heads of departments and not to individuals under those heads.

In breaking in new men the wire chief should not let them go ahead in a haphazard manner, but he should advise them what steps to take in order to properly clear the trouble. He should always show a willingness to explain why and how certain things happen. He should also encourage the beginner to ask any questions concerning the work.

"Absolute Co-operation" Slogan for Troublemen

This point is a good place to introduce the troubleman, so we will do so by suggesting the slogan, "Absolute Co-operation." The troubleman should always recognize the wire chief as being the head of the department and should

follow orders in such a way as will work for the speedy clearing of trouble in the proper manner.

Owing to the many new and complicated circuits in up to date switchboards, troubles may arise which are difficult to explain completely on a ticket and the troubleman may be in doubt as to just what to look for. The wire chief or tester should give verbally all information needed to help the troubleman. For instance, a case of trouble was reported as follows: Line No. 170 brings in supervisory lamp when operator rings and party does not answer. Volt-meter tests showed the line clear in every way, so inside trouble was tested for. Further test and inspection showed the line to be clear to the cable terminal in the office. About the only thing which could cause that kind of trouble was ringing current jumping to ground. The troubleman was told to inspect all arresters including those at the terminal can. He followed orders and stopped at the cable terminal first; inspection showed the carbons to be of the old type and slightly dirty. New treated carbons were placed in the line and there was no further trouble.

Should the troubleman find a mistake had been made in writing the ticket he should ask the one who makes it for a correction. Mistakes in addresses or names of parties should be noted on the ticket and returned in order that the records may be corrected.

The Troubleman Has Twenty-Four-Hour Job

The wire chief should know where every troubleman lives and where he may likely be found during off hours as an emergency may arise and he will be needed. One of the main things for a troubleman to remember is that he must be willing to come out when called. In other words, on most plants he has a twenty-four-hour job.

The man who shows the co-operative spirit should be treated in the same manner. He should not be called after working hours except in emergency cases. After storms, fires, etc., it is well for him to call the wire chief, as he may be needed. Sometimes it is necessary to work late or on Sunday after a hard storm. These jobs are part of the business and his willing help is necessary.

The troubleman should read his tickets carefully and should know what he is going after. He should learn the circuits of the different instruments so that he can avoid doing a lot of extra work which doesn't bring results. He must learn to get to the bottom of the trouble and remove the cause. A few minutes spent in studying the cause of certain troubles may save an hour in clearing them. Also he should learn volt-meter and bridge tests are to be relied upon, and the information obtained from them should be heeded.

No matter how well a plant is taken care of, there are bound to be parts where trouble is more frequent than it should be. By knowing these places the man will be able, by a glance at the ticket, to figure out just where the trouble is most likely to be found.

It should be the aim of everyone in the trouble department to see that trouble is cleared as quickly as possible. When the troubleman gets his tickets he should route them so that he will not double back on the route or unnecessarily have to go back to territory he left a short time before.

Important Lines Have Right of Way

As a rule he should first clear the lines which affect the most parties. Usually these are open or permanent signal lines. Important stations, such as doctors, business houses, and places where there is sickness should be given preference over the ordinary run of trouble. Should the tickets show a scattered route, he should call in and find if there are any other cases in the locality before he goes to another part of the territory. He should OK each case of trouble as soon as it is cleared, so that if the ticket becomes lost the record shows that the man has cleared the trouble.

The troubleman must learn to clear trouble so that it will not come back at the same or any other place. Repeaters don't look good for the troubleman. Where a cross is knocked out he should pull slack or make some other good arrangement to keep the same trouble out the next time the wind blows. When clearing grounds on guys, cables, roofs, etc., he should insulate the line or change its position on the pole or building.

Grounds in carbons seldom appear except during storms or in case of a cross with higher voltage line. Wet carbons are generally due to someone's carelessness in leaving terminal covers off or open. Troublemen should notice each terminal they are near and be sure the cover is in its place. Carbons and fuses are used for a good purpose and should always be in place. Troublemen should carry a few extra carbons, fuses and micas and use them when needed. Fuses, as a rule, will stop low frequency currents. Carbons are the real protection against lightning and other high frequency currents. They are the real cable protectors, and should be used wherever there is chance of high tension crosses occurring.

Careful Work at Cable Terminals Will Prevent Trouble

Should the troubleman have to change cable conductors he should avoid running jumpers in the cans or boxes, as that only creates another chance for trouble. It is better to remove the bridle entirely from the bad wire and place it permanently on the pair to be used. He should be warned to be careful about putting wires under screws, particularly in the older type cans. In the older type terminal cans the wires of the cable are soldered direct to the screws; therefore loosening the screws will twist the wires off inside the can, thereby opening the circuit.

Right here it may be said that if there is a plant anywhere using the old type wooden boxes which have copper or foil ended type of fuses, which are slipped under or between brass springs, they should be got rid of, as they are the cause of many cutouts and high resistance joints. The tubular or pencil fuse is by far the best.

When it is necessary for the troubleman to climb through a lead to clear a case of trouble he should be sure, before he comes down, that he has not caused other lines to cross or ground, or that he has not broken bridle wires or otherwise caused trouble. While he is on a pole and has the time to spare he could clean any bad joints or clear anything else which is likely to cause trouble. The hot, dry summer days sure do show up the bad joints.

The Troubleman Is a Trouble Preventer

When the troubleman sees things which will cause trouble and he is unable to clear them a report of the condition to his foreman or wire chief should be made, so that the trouble can be remedied as soon as possible. When it is necessary to cut insulation it should be wrapped with at least two thicknesses of tape, which should extend not less than one-half inch past the cut. This prevents rust. Iron wire twisted pair, not being heavily galvanized, will soon rust. The copper coat on copper-clad twist is easily scraped off and the steel wire is soon eaten in two. When a splice is made in twisted pair wire it should be soldered or wrapped with foil before being taped. Vines or trees allowed to grow around the wires sooner or later will be the cause of shorts and grounds. Where they interfere with the wires, permission to trim should be obtained and a good job done. It is well to keep in mind that the good troubleman does as much to prevent trouble as he does to clear it.

Some Suggestions in Training the Troubleman

If he has time to spare train him to spend it at places that need new cords or rewiring. Instruct all men to use care in climbing old poles; if a pole is broken, to report it; not to grab braces, cross-arms or brackets to pull

themselves up by, but to use the pole or steps. Warn them to be careful to keep clear of grounds when climbing through electric light or power wires. Have all men be on the lookout for breaks or bad places in cables; to tape these places and report the location to the wire chief.

Teach men where it is necessary to change an instrument, to do so at once. Do not tell a subscriber that he needs a new phone, and then forget it. The subscriber won't forget. Educate new men on trouble jobs to know that there will be many things come up with which they are not familiar. When that happens, have them go to someone who is older in the business and get the help they need. Don't let new men butcher a line or telephone; if they don't understand, train them to ask for help, rather than do guesswork.

There was a time when a new man had rather rough going because the older heads were afraid they would lose out if they told the kid anything that would help him. Years ago companies were looking for good men and they are still looking for them. So don't be afraid to break in a kid once in a while; if you are a good teacher, your job is that much better.

The Troubleman as a Public Relations Expert

As was stated before, the troubleman is the one who comes into most direct contact with the subscriber; his actions go a long way towards making friends for the company. He should avoid arguments which may place him or his company in a bad light, but should always be ready to reason out any grievance or fancied wrong the subscriber may have. So far as the average subscriber is concerned, all he knows of the telephone business is that he has a telephone, that an operator should answer him when he calls, when his bell rings he is wanted, that he pays for service, and service is what he wants. The troubleman is an important factor in giving that service, and what he does and how he does it will go far to make or mar it. Operators and other employes should not be criticised, but their apparent shortcomings should be explained diplomatically.

In conclusion, let me say that the best rule to work by, both with subscribers and with fellow-employes, is the Golden Rule. It is one rule that never failed.

Test Wooden Pole Strength

Forest Products Laboratory Engineer Discusses Laboratory and Field Tests of Wooden Poles and Use of Data in Design of Pole Line—291 Poles Tested.*

To obtain information on the comparative strength of western red and northern white cedar and other species proposed for pole timbers, a number of poles of various species were tested by the Forest Service in cooperation with the University of Colorado at Boulder, Colo., and the University of Washington at Seattle, Wash. The results of these tests furnished data as a basis for pole design and also compared two seemingly different methods of test which are discussed in a paper, "Results of Some Strength Tests on Wooden Poles," by Thomas R. C. Wilson, Engineer in Forest Products, Forest Products Laboratory, Madison, Wis., a resume of which follows:

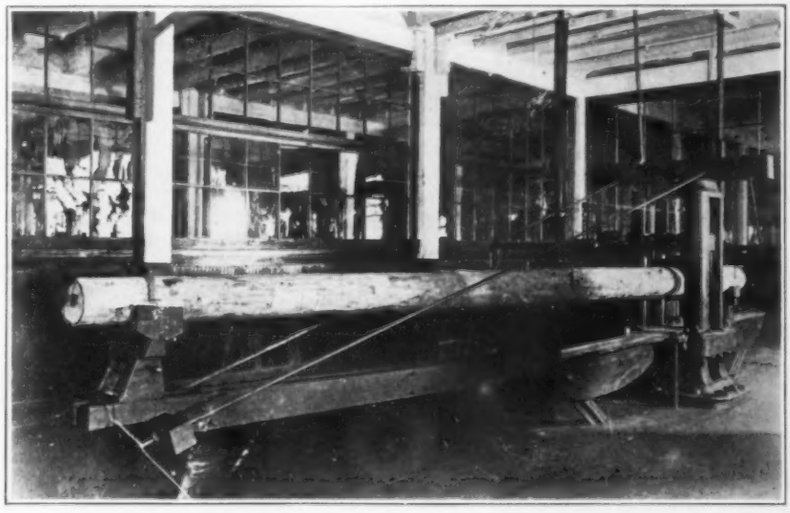
These strength tests were made on 291 poles 25 ft. long and simulated the conditions which exist when a pole of this length is set about 5 ft. in the ground and given a side pull at the point of attachment of the crossarm.

Method of Test

Two hundred and sixty-one poles were tested by a method originated and in use by the Forest Service since 1911. The 25-ft. pole is supported in the testing machine illustrated 1 ft. from the butt and 1 ft. from the top, making the span 23 ft. The load is uniformly applied 4 ft. from the butt support (or 5 ft. from the butt end), which is approximately the ground line.

The remaining 30 poles were tested by a method used some years ago by the Pacific Telephone and Telegraph Co. In this method the poles were placed in a horizontal position, with the butt end held between heavy posts set in the ground and the load applied as a side pull at the top end by means of a winch.

Apparently the conditions in an actual pole line where the top of the pole is pulled sideways by the tension of deadened wires, or by wind pressure on the wires, are more nearly reproduced by the method of the Pacific Telephone and Telegraph Co. than by the Forest Service method. The force or pull acting on the top of the pole is definitely known in each case and the data show that similar results are obtained by these methods.



Forest Service Method of Testing Poles—Pole Supported One Foot from Each End and Load Applied at Ground Line

Summary of Results

The values for modulus of rupture or ultimate breaking strength given in the accompanying table are suggested for use in pole design and are based on the results of the poles tested,

(Continued on Page 42)

*Courtesy of Wood Preserving News.

Illinois Has 450 at Peoria

"Harmony" Convention Big Affair—Finance Problems Loom Large—Plan Submitted for $25,000,000 Bond Sale—Utilities Goal "Public's Respectful Silence"

By Staff Correspondent

Peoria, Ill.—A notable array of talent from within its ranks, and two practical stars from the outside, gave the Illinois Telephone Association one of the most interesting programs in the organization's history. The 450 executives, sales representatives and operators who made the new attendance record were well repaid by the practical benefit of the "Harmony" convention and traffic conference.

Dr. R. E. Gordon, who was re-elected president at the meeting, made some pointed observations on the importance of showing the public the inside of the telephone business as protection of the utility interests from political attack. He counseled care in voting for men who would give the telephone industry a square deal at the forthcoming elections. He expressed gratification at the help the Illinois Commerce Commission had given the state's smaller companies.

Among the recommendations for association work during the new year Dr. Gordon listed standardization of toll lines, solicitation of government reduction or removal of the toll message tax and adoption of a financing plan for the smaller companies. He also referred to the use of the services of Miss Pearl Thompson, the association's operators' mentor, as advancing the association's effort to standardize operators' practice.

The service spirit as the guide of the telephone worker, was the subject of a number of inspiring paragraphs in the presidential address. Dr. Gordon cited the district meetings and operator's conferences as valuable factors in welding the association together as a mutually helpful entity, and paid tribute to the efforts of Jay Mitchell in promoting the organization's progress.

Plan Financing

In the report of Sec.-Treas. Jay G. Mitchell, emphasis was placed upon the financing problems of the Independent telephone companies, and recommendation was made that a committee be appointed to work out with the headquarters of the association a plan for marketing telephone company bonds in issues of less than $250,000.

Regarding traffic, Mr. Mitchell mentioned the organization of the association's new traffic department and the operating rule book now in preparation. He also suggested that the members of the association avail themselves of the association's services in relations with the Illinois Commerce Commission. The district meeting schedule also was given Mr. Mitchell's attention. During the past twelve months 28 telephone companies with a total of 957,709 units were added to the association's membership. Its finances were reported as being in a flourishing condition. The telephone industry's work with other utilities through the medium of the Illinois Committee on Public Utility Information, and its other efforts in advertising and public relations work were referred to by the secretary-treasurer during his address. Of the self-sacrificing interest taken by Dr. R. E. Gordon in the association's affairs, Mr. Mitchell spoke highly.

ILLINOIS ADMINISTRATION

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A. R. Patterson, Streator, V.P.

Jay G. Mitchell, Sec.-Treas.

Directors: Dr. R. E. Gordon, El Paso; E. S. Sterrett, Henry; W. H. Bassett, St. Louis, Mo.; H. H. Knipe, Olney; A. R. Patterson, Streator; J. C. Poole, Lincoln; E. D. Glandon, Pittsfield; A. R. Bone, Chicago; Dr. W. C. Lumpkin, Mattoon; T. C. Ainsworth, Bloomington; Dr. J. G. Schwarz, Jerseyville; F. A. Norris, Monmouth; C. B. Cheadle, Joliet; George X. Cannon, Freeport; H. G. Lankford, Chicago.

No Public Interest

Some radical and thought-provoking comments on public interest in public utilities were made by Frederic A. Stowe, editor in chief of the Peoria Journal-Transcript. Mr. Stowe, who was at one time with Chicago street railway company, prior to his return to the newspaper business, shocked the convention by saying there was no public interest in public utilities. He cited the public's indifference to the school system, the most intimate of all public utilities. A few years ago the United States Commissioner of Education stated that three-fourths of all public school teachers in the United States were incompetent, said Mr. Stowe. "Fancy the tumult that would be caused among the security holders of the American Telephone and Telegraph Co. if the directorate of that corporation should declare that 75% of its superintendents and managers were incompetent."

At other high points of his well received talk Mr. Stowe remarked:

"Much of the progress made by the public utilities of Illinois has resulted from a frank recognition of the facts controlling their business, facts which have been effectively presented and analyzed by the Illinois Committee on Public Utility Information.

"The first important fact acknowledged was that grafting politicians did not represent the people, that there never had been any popular authority for making the utility a football in politics, that the people could not be served and that the utilities could not survive if compelled indefinitely to submit to blackmail and political terrorism.

"The unholy alliance was wrecked when the state utilities commission was created some ten years ago and when there grew up a judicial opinion that a utility, despite franchise contracts was entitled to rates which would earn costs of operation plus a fair return on the actual investment.

"The press, which is another great public utility, offers the telephone, gas and electric lighting, heating and power companies as well as the street railway companies the best medium for reaching the people. Any of you who have any doubt respecting the utilitarian character of the daily newspaper need only correspond with the retail merchants of New York City to ascertain what effect the recent webb pressmen's strike in that city had upon their business.

No Love for Utility

"But the public never will love a public utility. Your utmost goal is its respectful silence, not its affection. All utilities irritate the public. 'Busy, please call again,' takes all the sentiment out of the patron of a telephone company.

"The monthly statement also is an irritation, and not the less so because the telephone is a necessity. The public spends freely for luxuries, but growls over the cost of necessities.

"The best thing a utility can do is to

minimize these irritations by improving its service, by avoiding foolish controversies with the people or their agents, by maintaining a worldly wise and diplomatic personnel and by popularizing its securities.

"Nothing tames a utilities baiter so quickly as the acquisition of some of its stocks and bonds. There are 500,000 owners of public utility securities in Illinois and an aggregate investment in the state of $1,300,000,000. Aided by this vast army of recruits whose self-interest depends upon unfettered business management of the utilities, their directors should have no great difficulty in combating demagogy provided they 'come clean' with press and public."

Other light on the problem of getting, and keeping, in right with the public, shown from the addresses made by W. S. Vivian, director of Public Relations of the Middle West Utilities Co., who went into the reasons for telephone companies advertising with a thoroughness and intimacy born of long and successful experience in the telephone industry. He also told of the growth of public utility advertising among the country's major divisions of advertisers.

"Thank You" Club Makes Friends

The public problems of a telephone company also were spotlighted in the interesting message of A. R. Bone, general commercial superintendent of the Illinois Bell. Mr. Bone presented some figures showing the commercial rating of Illinois in diversified lines and showed that the utility business of the state kept steady pace with its other industrial activities. Per person, Illinois has $230 invested in its utilities, Mr. Bone stated. He told of the "Thank You" club of the Illinois Bell's suburban department commercial division, which numbers all of that division's employees on its roster. As another aid in making satisfied customers Mr. Bone told of the "Pink Ticket" activities of the Illinois Bell whereby every employee is made an instrument for the location and removal of subscribers' complaints. He also told of certain cases where ignorance of the utilities' problems had caused them to be unjustly criticized.

To Educate the Boss

"The national association this year is turning its efforts to the education of the 'boss', said F. B. MacKinnon, president of the United States Independent Telephone Association, to the Illinois meeting. Financing necessities of Independent companies also came in for attention in President MacKinnon's remarks. The head of the Independents told of the organization of the staffs of the Class A companies under the association's plan, so this keen and capable talent would tell the smaller companies, through the association, what was needed in raising and maintaining high service standards.

Uniformity in telephone company bonds, backed by authoritative engineering, valuation and audit reports, will put them in a readily salable class, according to J. L. Reynolds, vice president of Joyce-Reynolds and Co., Chicago, who outlined his company's plan for financing Independent telephone companies.

Market for 25 Million Bonds

In 1924 the companies with which Mr. Joyce is connected would buy $25,000,000 of Independent telephone bonds if the plan he proposes to the Illinois association is acceptable to its members. He referred to the General Motors "Acceptance" organization in outlining a plan for telephone company financing. He said that the cost of handling the 15- or 20-year securities which he recommended would involve a spread of only one point over whatever the market rate on money happens to be.

Informally, A. B. Patterson, of Streator, spoke on the development of better public relations by making the beginning among the utilities' own employees, and illustrated his talk with screen reproductions of some of the messages he displayed weekly for the education of his own force.

Digests of the addresses made by J. W. Gorby, Chicago, assistant to the president of the National Transportation Institute on "The Relation of Transportation to the Telephone Business," and by Dean C. M. Thompson, of the University of Illinois, on Public Utility Training Courses at Illinois, are reproduced elsewhere in this issue.

Other events on the executives' program were the inspirational speech made by Prof. E. J. Llewelyn, of Greencastle, Ind., on "Waste," and the plea for telephone company encouragement of efforts to institute state police in Illinois, which was presented by Capt. Charles H. Dayton.

Traffic Conference

With 150 in attendance at the traffic conference, the discussions brought out the various aspects of the subjects under consideration with a thoroughness which made the sessions well worth while. A number of managers attended the meetings, which were conducted by Miss Pearl Thompson, head of the association's traffic department. Harry E. Eldridge, division traffic superintendent of the Illinois Bell company, with a paper on "Morale in a Central Office," also figured prominently in the success of the traffic conference.

Features of the program included the papers on "The Line Operator Does Her Bit," by Miss Maie Kee, of the Murphysboro Telephone Co., and on "The Reporting and Accurate Timing of Toll Calls," by Miss Rose Sarver, chief operator for the National Telephone and Electric Co. at Clinton, Ill. Correct education of the operators and proper procedure in handling toll calls supplied Miss Kee with material for a very practical paper. Miss Sarver stressed the importance of impressing upon the patron the operators's desire to serve to the best of her ability, by intelligence and tact in acquiring necessary information.

Call for the "Golden Rule"

Among the resolutions adopted by the convention during its final hours were those tendering thanks to Dr. Gordon for his services as president, a recommendation that the war toll tax be repealed, and a call upon the members of the association to apply the golden rule in social, political, and business life. The association's concern in foreign affairs was reflected in a resolution which called upon the members "to take that interest in their respective communities which will make it easy for those who represent us in our national government to adopt policies consistent with the teachings of our Lord and Master."

An interesting detail of the convention program was the competitive demonstration of first-aid staged by teams from plant departments of the Illinois Bell Telephone Co. at Peoria and Springfield.

The convention closed with a banquet and dance at which A. R. Patterson acted as master of ceremonies. At this affair, as well as the theater party on the opening night of the meeting, all attending the convention were guests of the association.

Exhibitors Active

Busy Throng of Executives and Operators Visit Displays at Illinois Convention

Peoria, Ill.—Executives and their department heads, who traveled from room to room visiting the exhibits at the Illinois "Harmony" convention, had company this year. The operators who attended the traffic conference displayed a keen interest in all phases of the business, and with characteristic feminine curiosity kept the men of their own companies and the sales representative busy holding school.

The leading manufacturers of telephone equipment staged demonstrations that gave a close-up of the advanced ideas in telephone practice. Automatic's demonstration, the Kellogg and Stromberg-Carlson boards and the equipment displayed by American Electric and Leich, all were

closely studied. The protective equipment displays of Cook and Reliable proved centers of interest for plant men. Hap Crawford with his Everstick anchor and cable ring exhibit, Page and Hill's educational pole display, the battery showings of French and the National Carbon Co. and the Illinois Electric Co. layout completed the array of equipment.

Phil Lenz of the Runzel-Lenz company continued to book big business on the new switchboard cord which made such a hit at the national convention. The Lynton T. Block Co. was represented by Ferguson and Jackson, per schedule, and the Bowdle display of printed forms for telephone companies, which is always a well patronized Illinois convention feature, also ran true to form. Harry Eng of the American Appraisal Co. showed some of the evidence of that company's work, at the meeting. The Standard Underground Cable Co., Index Visible, Anaconda Copper Co., Naugle Pole and Tie Co., and other supply companies were actively represented. Among the nationally prominent Independent figures at the convention was Jack Coffey of Indianapolis, who was present for a day looking over the prospects for accounting service.

Con Curran, jr., and R. M. Woolfolk of the Con. P. Curran Printing Co. showed the standardized quantity production forms and directories of the Curran company in a room that was replete with samples of the work. Speaking from the convention floor on the idea which the Curran company is introducing, Mr. Woolfolk emphasized that the scope and character of the Curran service meets the requirements of all companies. The quantity production price is obtained by standardizing practice with respect to printed matter along the same lines that the Curran company has proved successful and thrifty in the railroad industry. The equipment of the Curran plant is designed and laid out to keep down the costs of such standardized printing, and the services of the Curran experts, as well as the plan which allows ordering out printed matter on the annual contract, as needed, make the plan admirable for telephone requirements, said Mr. Woolfolk. He also spoke of the Curran standardized directory, and the basis upon which the Curran company handles a directory contract, and solicits advertising locally with its own force of specialists.

The National Cable Compound Company's exhibit of Ever-Protect cable compound also was one of the features of the Illinois meeting. There was a demonstration of the method of laying cable without conduit by employing Ever-Protect protection. There also was an installation of Ever-Protect on aerial cable. In this case Ever-Protect keeps dampness from penetrating crystallized and checked cable sheathing, and prevents rust on messengers. Used on the gains of poles Ever-Protect preserves poles and makes a perfect water-shed, according to Stephen M. Isom and K. K. Drayne, who represented the company at Peoria.

Telephone in Railroad Work

On 100% Basis in 25 Years, Forecast

By Capt. John W. Gorby

"Few of the public realize that the telephone is fifty-fifty now with the telegraph on the railroads of America," declared Captain John W. Gorby, assistant to the president of the National Transportation Institute, in an address to the annual convention of the Illinois Telephone Association at Peoria, Ill., Nov. 15. "At the present rate of increase it will take about twenty-five years for the telephone entirely to replace telegraph instruments on the railroad systems of the United States. According to the records, not an accident is attributable to the use of telephoned train orders."

Captain Gorby drew a picture of the place held in railroad history by the time-honored brass key. Railroad managers feared the telephone at first, he said, and had to be convinced that the telephone was safe. Now they want the telephone because of its greater speed and availability in all emergencies.

"From the early days of railroads the brass telegraph key has been a vital part of the system," said Captain Gorby. "No figure is more firmly established in all the romance of railroading than the telegrapher bending over his key, speeding messages, dispatching trains, sending the orders that mean life or death. But so great is the speed and efficiency of the telephone that it is rapidly replacing the telegraph system in train dispatching.

"By the so-called Administrative Railway Bill of 1910, the telephone and telegraph lines operating across state boundaries are placed under the Interstate Commerce Commission. At the time this bill was passed by Congress, the Interstate Commerce Commission had authority over 236,000 miles of railroad, and, according to the census of 1907, there were 22,996 telephone and telegraph systems with a single wire mileage of 14,570,142. By virtue of this law, the telephone system of the United States became part of the general transportation system.

"The Interstate Commerce Commission, in its latest report, says: 'A decrease of 3,520 miles in the length of railroad line on which the telegraph is used, and an increase of 5,067 miles in the length of railroad line on which the telephone is used for the tranmission of train orders is noted.'

On 50-50 Basis with Key

"According to the best authorities, the telegraph and telephone are now used as means of communication, dispatching in particular, on about a 50-50 basis in the United States. The C., B. & Q. was one of the first roads to use a telephone for train dispatching. They last year added 346 miles to 3,893 miles already using the telephone for train dispatching. The Pere Marquette in 1922 installed 385 miles, a pretty large proportionate increase.

"The Panama Railroad in the Canal Zone demonstrated how effectively the telephone might be used in practically all forms of railroad service, over an area of 470 square miles, equipping some poles with telegraph and some with telephone wires.

"The railroads of the South generally, including the Southern, the C. & O., the Norfolk & Western, the Seaboard Air Line, and others, have developed the telephone for their train dispatching until today we may say, without exaggeration that the telegraph for train dispatching is gradually passing into the realm of outgrown facilities.

"A recent editorial in a leading railway publication urges the increased use of telephone on account of its great advantages in securing information directly from train crews regarding location of trains, delays, and accidents, as well as expediting the dispatching work itself. There is a distinct argument also on the basis of reduction of operating cost and the increase of track capacity."

Telephone Advantages

Advantages of telephone dispatching, Captain Gorby stated, are:

"First, speed. An expert telegrapher could transmit 50 words per minute. But the ordinary telephone dispatcher could transmit clearly 100 words per minute. The records show that not a single railroad accident has occurred due to telephone method of dispatching.

"Second, a distinct gain in discipline and co-operation, since the telephone

method of communication allows a greater play of personality and actually relieves the loneliness of many an operator in the outlying places of the desert or the mountains. If Tom, the operator, can call Bill up, 38 miles away and say, 'Bill, 32 has just passed,' he feels much better acquainted, and in the lonely hours that may pass, and the long night stretches, the telephone offers the means of making life much more agreeable for him whose responsibility requires being everlastingly on the job.

"Third, it has been found that the nervous strain on an operator using the telephone is not nearly so great as the incessant handling of the telegraph keys, tiring the muscles and affecting the temper of the operator.

"Fourth, remarkable flexibility is one of the reasons the telephone has in such large measure replaced the telegraph in railroad intercommunication.

"Fifth, the value of the telephone in emergency service. By carrying a portable telephone set the conductor may at any place hook his line over the wire and call for help to any section on the line almost instantly, clearly, and without any doubt as to his reason for doing so. In this way the telephone has proved a saver of life as well as of time and trouble.

"Without doubt the telegraph would have been superseded more rapidly by the telephone had it not been for the expense of installation, involving an increase in physical conditions and considerable expenditure of money. You know that the poles were, on several railroads, already overburdened with telegraph wire equipment.

"The coming of the electric car created a new era, especially for telephone dispatching, by jack box connections at quarter-mile intervals, and on switches and sidings, by telephones in booths at regular intervals; the coming of the interurban electric car has indeed brought nearer the practically universal use of the telephone for such purposes by many years."

The telephone, Captain Gorby said, increased highway transportation, both for pleasure and for business. Motor mileage would be greatly cut down, he declared, if one did not know that it were possible at all times by telephone to get in touch with friends over long distances. Motor truck transportation has been made possible over long distances by the fact that telephonic communication renders such service satisfactory to shipper and carrier.

All the Latest Telephone Books at Lowest Publishers' Prices, from TELEPHONE ENGINEER

Trains Future Chiefs

C. M. Thompson, University of Ill. Dean, Tells Convention of Utility Course

Peoria, Ill.—"A new venture in educational circles that is being watched with interest is the training of young men for public utility careers by the University of Illinois," Dean Charles M. Thompson, of the College of Commerce of that university, told members of the Illinois Telephone Association at their "harmony" convention. He explained that the course was started this fall, and, as far as is known, is the only curriculum of its kind offered in America.

The dean pointed out that the work in public utilities at the State University has two objects in view: "First, it attempts to train men in the principles of technique; second, it attempts to send out the graduates of this course with some idea of the relation that ought to exist between the public and the utilities that serve the public. Both aspects are important and will add to a better understanding and to better service.

"During the past century and more, economic thinking has been under the spell of the theory of competition advanced by Adam Smith and his disciples. All the while the importance of publicly regulated industries has been growing, until now these industries require more than forty billion dollars of capital and give employment to millions of men and women.

"By taking this advanced step, the University of Illinois insures for the graduates of this course a better appreciation of public utilities problems than most of us have at the present time.

"This course at Illinois provides for extended instruction in economics, accounting, mathematics, finances, business organization and operation, business law, and marketing. It requires a thorough knowledge of American and state history, and of the problems and policies of national, state, and municipal governments. A careful analysis is also made of labor problems and public finance methods; constitutional and industrial problems are also discussed. In the junior and senior years of the course much time is spent in learning the principles of rate-making, railroad transportation, and the management, operation and regulation of public utilities.

"If the University can send out each year a group of well educated young men trained in the fundamentals of rendering services to the public, it will have justified itself once more in the eyes of the taxpayers of the state."

Murphysboro Changes

O. F. Glenn Buys Controlling Interest from A. B. Minton —Plans Extension

Murphysboro, Ill.—State Senator Otis F. Glenn of Chicago, vice president and counsel of the Murphysboro Telephone Co., has bought controlling interest in the company from President A. B. Minton. Mr. Minton is credited with owning 60 per cent of the stock of the company which represents an investment of approximately $1,000,000. A new company, known as the Illinois Southern Telephone Co., is to be organized to take over the holdings of the Murphysboro company and other exchanges and lines in southern Illinois.

There will be no change in the operating personnel of the company, it is said.

The company started in 1894 with one exchange having 21 subscribers, and at the time Senator Glenn acquired control it had 41 exchanges and 15,000 subscribers. Mr. Minton became interested in the property when he was compelled to take it over together with the late Thos. M. Logan, when the original owner could not meet the mortgage on the plant given as a security for a loan made by Messrs. Minton and Logan.

Illinois Next for Highway Telephone Service?

Peoria, Ill.—Highway telephone systems soon may be features of the Illinois extensive hard road system, according to John G. Lusby, vice-president and construction engineer of the Highway Emergency Service, Harrisburg, Pa. Mr. Lusby spoke briefly at the Illinois Telephone convention in outlining the character of the Highway Emergency Service. Telephone companies receive an installation fee for each telephone installed in the boxes which are one mile apart along the highways. Regular monthly rental fees also are paid to the telephone companies. Keys to these telephone boxes are supplied to motorists at a cost of $5 a year. There are at present 2,500 miles of highway telephone service extending from Atlantic City, N. J., to Youngstown, Ohio. In Pennsylvania the state police are supplied with keys and frequently employ the service. The telephones are not on the line except when the doors on the boxes are open. When the boxes are opened at night, the boxes are automatically illuminated. Telephone numbers of nearest garages, doctors, and other emergency telephone numbers are given inside the boxes.

Your Stromberg-Carlson Man Is Here

Here are the men who sell the products of the Stromberg-Carlson Telephone Mfg. Co. as they assembled at their annual picnic, which is one of the features of the S-C yearly sales conference. The group picture was taken at Huntington Hills, N. Y. It is due to these men that the Stromberg-Carlson sales have maintained a steady increase, year by year. Since 1914 the company's sales have quadrupled, and at this year's sales conference the selling force determined to make the past record look pale.

New Booklet on International Communications from Department of Commerce

Washington, D. C.—A new booklet of special interest to users of international cable or radio service has been published by the Department of Commerce under the title, "International Communications and the International Telegraph Convention." The author is Mr. P. E. D. Nagle, communication expert of the department. Recent construction and development is described and the rules governing the different classes of service and the methods of classifying telegraphic codes are given. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from the Bureau of Foreign and Domestic Commerce by sending the price, 10 cents in coin or money order.

Standard Underground Makes New Appointments

Perth Amboy, N. J.—The Standard Underground Cable Co. announces the following changes recently made in their Perth Amboy, N. J. organization: H. W. Fisher has been advanced in title to Technical Director of Electrical Engineering, while continuing also as manager of Lead Cable & Rubber Departments. R. W. Atkinson has been appointed Chief Electrical Engineer. G. J. Shurts has been made Production Manager of Lead Cable Department.

Two items make telephone service —transmission and treatment.—F. B. MacKinnon.

Charles T. Wiley Named Manager of Richmond (Ind.) Company

Richmond, Ind.—Charles T. Wiley has been made manager of the Richmond Home Telephone Co., succeeding the late William M. Bailey. Mr. Wiley is a graduate of Purdue University. He was with the Bell company for five years following his graduation from Purdue and for two years was connected with the Richmond company when automatic equipment was being installed. He organized the Richmond Electric Co. For five years he was with the Adams Bagnall Electric Co. of Cleveland as Indiana and Ohio traveling representative, and immediately prior to his appointment as manager of the Richmond Home Telephone Co. was Cincinnati sales manager of the interior lighting department of the Westinghouse Electric and Mfg. Co. He served overseas as captain in the 37th Engineers.

William Aaron Now Factor in Eldorado (Ill.) Company

Eldorado, Ill.—Wm. Aaron, who was connected with the Murphysboro (Ill.) Telephone Co. for 18 years, has purchased an interest in the Eldorado (Ill.) Telephone Co. and will act as secretary and assistant general manager. W. L. Ford is president of the Eldorado company which also operates an exchange at Harrisburg.

Dixon, Ill.—The Dixon Home Telephone Co. plans improvements and extensions involving an expenditure of $55,000 in 1924.

Japan Sends S. O. S. for Simplex Jacks to Rebuild

Chicago, Ill.—Illustrative of the reputation of a good tool and its first-aid service is a story from the Japanese earthquake disaster. Almost immediately after the quake had subsided Templeton, Kenly & Co., Ltd., of Chicago, received cablegrams to rush to Japan quantities of No. 329 Simplex pole pulling and pole straightening jacks. This they were partially able to do through the stock maintained at San Francisco and by borrowing from the stocks of the Western Electric Co. and other jobbers on the coast.

Additional quantities were immediately dispatched from Chicago to San Francisco, and it is safe to predict that the telephone and power lines will be quickly restored through these typically American first-aid tools.

D. E. McGregor, Kellogg Man, Buys Nebraska Telephone Property

Grand Island, Neb.—D. E. McGregor, for the past 3½ years a representative of the Kellogg Switchboard and Supply Co. has bought the interest of Edward E. Piper in the Farmers Telephone Co. of Shelton and Gibbon. Mr. McGregor will act as manager of the property which was rehabilitated and made a paying enterprise by Mr. Piper after a group of farmers, thinking the rates were too high some time ago, bought the plant themselves and eventually sent out an S. O. S. Mr. Piper will represent the Korsmeyer Electrical Supply Co. of Omaha.

Valuation in Rate Making

Chapter XV. Non-Physical Assets (Continued)

By CHARLES W. MCKAY, Associate Editor*

As suggested in the last installment, the Metcalf-Alford method is a trifle too complicated to be discussed in detail in connection with the present series of articles. The suggestion that the method is "too complicated" is certainly no reflection upon the reader's ability to grasp the subject—the writer simply means that the Metcalf-Alford method is so involved as to render its use questionable in connection with telephone rate and valuation work. The writer has known of more than one case where the element of Going Value has been thrown out of court entirely—for the simple reason that its exposition, when propounded through the medium of the Metcalf-Alford method, seemed so complicated that the court became disgusted.

Aside from Going Value there are several elements component to the total of non-physical assets. These are:

Cost of Franchises.
Cost of Temporary Financing.
Cost of Permanent Financing.
Value of Long Term Contracts.

It may be well to say a word at this juncture as to Good Will values. Despite contentions to the contrary there is no such thing as a Good Will value for a monopolistic public utility corporation. The reason for this is almost self evident from Lord Eldon's famous definition of Good Will. "Good Will," says Lord Eldon, "is the probability that the old customers will continue to resort to the old place of business—in other words, it involves an element of personal choice." Obviously, in the case of public utility corporations—and especially telephone companies—there can be no element of Good Will. Except in a very few instances, if one is dissatisfied with telephone service, he can do without it—but he cannot subscribe to the service of a rival company.

Reference to Good Will is made at this juncture—due to the fact that so many people are inclined to confuse Good Will with Going Value.

Just to review—let us re-state the definition of Going Value. Says Mr. Henry Floy: "Cost to replace new, replacement cost, or cost of reproduction—these terms so much in evidence nowadays and recognized by the courts, refer to an assumed value based on the estimated cost of reproducing the property new on the basis of prices current at the time of the estimate—prices that fluctuate are averaged for five years preceding the date of an appraisement—and are made up to include everything that can be inventoried regardless of original cost, age, service value, or present condition as affected by depreciation."

Mr. Floy goes on to state that in order to adhere strictly to the reproduction cost theory—we must provide for the reproduction cost of the business attached to the plant, as well as for the reproduction of the plant itself. The plant without business attached is a dead thing and of little value to the public at large, or to its owners. Going Value, in reality, is the difference between the value of a plant with business attached and the value of the purely physical property.

Now as to the other items of non-physical assets hereinbefore listed—the courts have ruled repeatedly that no value can be placed upon franchises over and above the actual costs involved in securing such franchises. In other words, both courts and commissions have—almost without exception—taken the viewpoint that a franchise is a gift of the people and, therefore, the people should not be required to pay a return upon it.

Nevertheless, there are certain costs involved in securing franchises—and perfectly legitimate costs. These costs may assume the nature of a retainer for legal counsel; the cost of appearances before state or municipal regulatory bodies, etc., etc.

There is a very real cost involved in the financing of a telephone company. As previously suggested, this item of total non-physical assets may be subdivided into cost of preliminary financing and cost of permanent financing.

In considering the item cost of temporary financing—let us consider the case of a new company. Regardless of the opportunities offered to a telephone company in the district under consideration—most people, quite naturally, are not prone to hazard their money in a new undertaking unless the opportunity for gain is more alluring than in other, and safer, fields. The cost of preliminary financing may, therefore, be defined as the cost of "enticing capital."

After the preliminary capital has been secured and this capital has been invested in plant, the operating company has something tangible to negotiate. The company can raise its preliminary capital on short term notes—retiring these notes from time to time as the construction program progresses and replacing them with mortgages of a more or less permanent nature.

From the foregoing it should not be understood that the entire interest accruals against short-term notes are chargeable against the item "cost of securing preliminary capital." It is customary to charge the difference between the high rate and what may be considered a normal mortgage rate to the cost of securing preliminary capital.

Toward the end of the construction period—and especially after the company has secured a number of subscribers—little or no difficulty should be experienced in selling bona fide bonds

In this case also it is customary to charge the cost of selling bonds to "cost of securing permanent capital." In other words, if securities are redeemable at a $100.00 par value and are sold for $90.00, the difference ($10.00) may be considered a part of the cost of securing permanent capital.

The general attitude of courts and commissions toward the allowance of cost of financing, as a part of the rate base value, is evidenced by the following citation from an old but famous case—the case of Hill vs. Antigo Water Company—the decision being rendered August 3, 1909.

Quoting the language of the court:

"The plant in question here, for instance, was built by borrowed money or by the sale of securities which not only bear interest at the rate of 6% from the time they were issued but which also had to be discounted at not less than 8% besides. In other words, they brought 8% less than the par value in the money markets.

"If the plant was needed, and these were the best terms upon which the

*Mr. McKay is Manager of the Valuation Division of The Roberts-Pettijohn-Wood Corporation, Consulting Engineers, 646 North Michigan Ave., Chicago, Illinois.

capital for its construction could be obtained, it is certainly difficult to see what other disposition can be made of these charges than to include them in the cost of the plant, at least until they can be written off from earnings, if this course should be found advisable, for it is clear that no private parties would enter into a business of this kind if they had to foot such losses out of their own pockets.

"Such interests and discounts, therefore, often constitute a part of the price upon which the consumers must pay interest (in other words, rates)* if they desire the conveniences that are offered by the utilities (telephone companies, etc.)* because they are usually the best terms upon which such utilities can be had. These facts indicate quite clearly that the amount for which interest or discount that it may become necessary to include in the construction account, is a question that depends upon the facts in each particular case, and that it is a matter that cannot always be determined in advance."

There is still another item which is usually grouped with the total of the non-physical assets—value of contracts. In discussing the subject of contract values, Mr. Henry Floy, in his book "Valuing Public Utility Properties," states that while public service commissions have generally denied the right to capitalize contracts between corporations and public bodies beyond the actual cost legitmately expended in obtaining such contracts, yet under certain circumstances, these contracts may be capitalized. In stating that "commissions have generally denied the right to capitalize contracts between corporations and public bodies" Mr. Floy undoubtedly referred to contracts which are in the nature of franchise agreements. It sometimes happens, however, that an operating telephone company may have a favorable contract for the purchase of supplies or certain other materials—which has a real value and can be capitalized.

Mr. Floy cites the Union Electric Light & Power Company case where the Public Service Commission of St. Louis allowed the company to capitalize at 8% the rentals saved through an agreement with a local telephone company for the use of poles, allowing $80,000.00 therefor in the value of the property of the Light & Power Company—such value being determined for rate base purposes.

Mr. Floy states further that utility corporations have frequently sought to capitalize the net returns from profitable contracts; and adds that, on the grounds set forth in the following decision of the Public Service Commission of New York, such capitalization is not generally allowed.

"The contention of the company, as represented by the testimony of this witness, in substance is that the profits from this contract for its remaining life shall be capitalized, that the amount thus reached shall be added to the fair value of its property, and that the rates shall be such as will provide a fair return thereon. In other words, the city or the tax payers must pay an exorbitant price for street lighting, and yet the general consumer must pay enough to yield an ample return (10% was urged) upon the capitalized value of such abnormal profits, capitalized upon a basis of 4½ or 5%. The absurdity of such a contention is apparent. Paraphrased it is, 'The more the city pays the more the consumer pays.' If there is any relationship between these two factors it is, 'The more the city pays the less the consumer should pay,' and this has been recognized in many franchises for water and lighting plants. Indeed, the original contract and its history indicate that street lighting and price obtained therefor have always been very prominent factors, and at the beginning were the chief concern of the company. Apparently, the original plant was built principally with a view to this business, and the contract was a very important inducement to the company to begin operations. It is obviously unfair that this very contract should be used to make the public pay a higher rate than they would otherwise pay.

"The argument of the company proves too much, for, if it is correct, it could be argued that every contract should be similarly treated. The public lighting contract resembles other contracts between company and consumers. All are property, and presumably all are profitable. Those that are, could be capitalized if this one may, and the more profitable they are, the higher must the rates to others be placed. Conversely, if any one (contract) should not be profitable, the capitalized loss should be subtracted from the fair value of the other property and the rates lowered accordingly.

"It should be noted further that the company does not claim that the contract itself represents any investment, or that any deposit fee, or payment was required by the authorities.

"The Commission can find no reason in law or equity which would justify the capitalization of the street lighting contract and the inclusion of such capitalization in the fair value upon which the company is entitled to earn a fair return from the sale of gas to general consumers. It is unnecessary, therefore, to consider the methods of determining its value."

The foregoing quotation is interesting in that it is frequently cited in court and commission cases as being a reason why contracts should not be capitalized. The "contracts" in mind—it will readily be seen—are those between municipalities and public service corporations. In other words, they are in reality franchises and not contracts.

Let us look at the other side of the situation. It may be possible that a telephone company—in some way or other—makes a favorable contract for delivery of wire at a certain price over a period of two or three years. It may be that subsequently the price of wire rises appreciably. In such a case, it is a grave question as to whether or not the telephone company should be allowed to capitalize upon its shrewdness in buying upon a favorable market.

The foregoing is merely a suggestion and not a contention of the writer. Those so inclined could take the opposite point of view and contend that a debit (on the rate base value) should be made in cases where companies lose through the signing of unfavorable contracts.

There is still another item to be taken into consideration in determining the total value upon which rates should be determined—and that is working capital. Obviously, a telephone company cannot do business without having funds on hand to meet its payrolls as they come due; take advantage of cash discounts in the purchase of certain materials, etc.

Before taking up this phase of the problem let us review briefly the items component to the total of the physical and non-physical assets. Of course, working capital is a very tangible (and, therefore, physical) asset; but, in reality, it fall under a separate category—in setting up a rate case.

The physical property consists of two groups of items—those falling under the "direct construction costs" and those falling under the "indirect" or "collateral construction costs." Under the direct construction costs may be grouped the purely physical property—in other words, that part of the property which may be actually inventoried, cataloged and priced out.

The collateral construction costs consist of a group of items which are closely allied to direct construction costs but which cannot be allocated to the individual unit costs. To illustrate: Interest during construction is one of the items of collateral construction cost. Obviously, it would be out of the question to attempt to compute the interest accruing against a given pole (or any other item of plant) during the construction period. Nevertheless, this interest item is part and parcel of the total cost of the physical property—but, for convenience, it is segregated under the caption "collateral construction costs."

We have then the recapitulation shown on page 27.

If the reader has followed this series at all closely he will notice that a number of items have been left out in the recapitulation presented in Fig. 1. For instance, no allowance is made for "Omissions and Contingencies"; "Warehouse and Purchasing Expense During Construction"; "Tools and Tool Expense During Construction," and "Contractor's Profit." This has been done to simplify the illustration—and also for the reason that these items are frequently included in the

unit cost and, therefore, do not appear directly upon any recapitulation of values.

In the January installment of this series the subject of working capital will be discussed in some detail. Illustrations presented have been based upon the writer's own experience in collaborating with telephone companies in the preparation of their rate cases.

	Reproduction Cost	Present Value
Direct Construction Costs		
Land (I. C. C. Sub-account 211)	$.....	$.....
Buildings (I. C. C. Sub-account 212)	.....	.....
Right of Way (I. C. C. Account 27)	.....	.....
Pole Lines-Exchange (I. C. C. Account 241)	.....	.....
Pole Lines-Toll (I. C. C. Account 251)	.....	.....
Aerial Wire-Exchange (I. C. C. Acount 243)	.....	.....
Aerial Wire-Toll (I. C. C. Account 253)	.....	.....
Aerial Cable-Exchange (I. C. C. Acount 242)	.....	.....
Aerial Cable-Toll (I. C. C. Account 252)	.....	.....
Underground Conduits-Exchange (I. C. C. Account 244)	.....	.....
Underground Conduits-Toll (I. C. C. Account 254)	.....	.....
Underground Cable-Exchange (I. C. C. Account 245)	$.....	$.....
Underground Cable-Toll (I. C. C. Account 255)	.....	.....
Submarine Cable-Exchange (I. C. C. Account 246)	.....	.....
Submarine Cable-Toll (I. C. C. Account 256)	.....	.....
Central Office Telephone Equipment (I. C. C. Sub-Account 221)	.....	
Other Equipment of Central Offices (I. C. C. Sub-Account 222)	.....	.....
Station Apparatus (I. C. C. Sub-Account 231)	.....	.....
Station Installations (I. C. C. Sub-Account 232)	.....	.....
Interior Block Wires (I. C. C. Sub-Account 233)	.....	.....
Private Branch Exchanges (I. C. C. Sub-Account 234)	.....	.....
Booths & Special Fittings (I. C. C. Sub-Account 235)	.....	.....
Office Furniture & Fixtures (I. C. C. Sub-Account 261)	.....	.....
General Shop Equipment (I. C. C. Sub-Account 262)	.....	.....
General Store Equipment (I. C. C. Sub-Account 263)	.....	.....
General Stable & Garage Equipment (I. C. C. Sub-Account 264)	.....	.....
General Tools & Implements (I. C. C. Sub-Account 265)	.....	.....
Material & Supplies (I. C. C. Account 122)	.....	.....
Total Direct Construction Costs	$.....	$.....
Collateral Construction Costs		
General & Legal Expense During Construction	$.....	$.....
Engineering & General Supervision During Construction	.....	.....
Taxes & Insurance During Construction	.....	.....
Interest During Construction	.....	.....
Total Collateral Construction Costs	$.....	$.....
TOTAL PHYSICAL PROPERTY	$.....	$.....
Non-Physical Assets		
Cost of Establishing Business (or Going Value)	$.....	$.....
Cost of Franchises	.....	.....
Cost of Temporary Financing	.....	.....
Cost of Permanent Financing	.....	.....
Total Non-Physical Assets	$.....	.....
GRAND TOTAL	$.....	$.....

Fig. 1
Recapitulation of Assets (For Use in Setting Up Rate Case)

Stricken Japan Thanks You

Japanese Engineer Tells of Quake

N. Shinmyo, director of the Tokyo Central Telephone Office, writes TELEPHONE ENGINEER in appreciation of the sympathy and substantial aid given by American telephone men to the Japanese telephone workers at the time of the quake and fire in Japan.

A vivid picture of the loss in lives and property suffered by the Japanese telephone industry is reflected by Mr. Shinmyo's letter. It is apparent that the reconstruction problems are being handled with diligence, resourcefulness, and fortitude.

Director Shinmyo writes:

TOKYO CHUO DENWA KYOKU
(Tokyo Central Telephone Office)

"Tokyo, October 29th, 1923.

"To the Editor, TELEPHONE ENGINEER,
28 E. Jackson Blvd., Chicago, Ill.

"Dear Sir:

"Being one of your subscribers, we have before us a copy of your September number and have noticed your article under the title of 'Sympathy for Japan.' We herewith take liberty to express our heartfelt thanks for the kind sentiments therein shown towards us.

"You are quite right to say that 'the telephone industry sustained its full share of the loss in lives and property.' As a matter of fact, we have lost sixteen exchanges (including one long distance exchange) out of twenty, together with the headquarters, the operators' schools, etc.

"According to the latest investigation, we are exceedingly sorry to say that altogether 59 employees have perished and 14 more or less injured by the quake and fire, while 142 are still missing. Our entire force as on September 1st consisted of 6,568 men and women, of whose houses 2,473 have been burned down, while 133 houses entirely and 113 partly have been collapsed by the earthquake. It is all the more matter of great regret that most of the victims who have been deprived of their houses and property, some even their own lives, are of young girls.

"We were, however, able to reopen for public service on 29th September after first-aid repairs being made with the remaining four exchanges. We then could accommodate only 18,000 stations instead of former 115,000.

"We are well aware that the task of reconstruction will be so gigantic that it will not be completed in little time. But how soon all our subscribers will be put in a position to enjoy the telephone service rests largely upon our shoulders, and in this connection we shall leave no stone unturned. A plan is under contemplation that a few of the stricken Tokyo centrals will adopt Strowger automatic instead of former c. b. system.

"We shall be greatly indebted to you if you will kindly convey our sincere thanks for the profound sympathy and substantial help given by your government and people. The grandest manifestation of humanity such as shown by you in the moment of Japan's greatest need, so quickly and ably, will be remembered by our nation for a long, long time to come, and we believe it will contribute not a little to the friendly relation now existing between two great nations which are connected so closely by the Pacific water.

"Again thanking you for your kind sentiments expressed to us in the holy name of telephone fraternity, with kindest regards, yours most sincerely,

"N. SHINMYO,
"Director."

LINE AND DESK

CONDUIT AND MANHOLE SUPPORTED ON FLOOR BEAMS OF BRIDGE

A problem of particular interest in conduit construction in Elwood City, Pa., on the route of the Pittsburgh-Newcastle section of what will ultimately be a New York-Chicago long distance cable, is described in a recent number of "Long Lines." At this point it was necessary to route the cable over a bridge which spans a deep valley with precipitous sides. The bridge is a combination truss girder and concrete arch type of construction, the arch spans being on the shore ends and the truss span in the middle.

The conduit structure is supported by hangers attached to floor beams for the entire length of the bridge except at the arch spans. At the arch spans it was necessary to cut through the base of the arch just above the concrete piers and to provide a manhole at this point for the purpose of taking care of the difference in elevation between the duct on the girder side and arch side of the manhole. It was necessary to fan out the conduit where it crosses over the tops of the arches because of lack of room between the top of the arch and road pavement.

There are three manholes on the bridge, one in each arch adjacent to the girder span and one near the middle of the bridge, the last being of special construction. This manhole consists of a framework of iron suspended from the under side of the bridge and is three and a half feet wide by 15 feet long. It is needless to say that cablemen will not be called upon frequently to pump water from this manhole.

THE CORD CIRCUIT TELEPHONE REPEATER

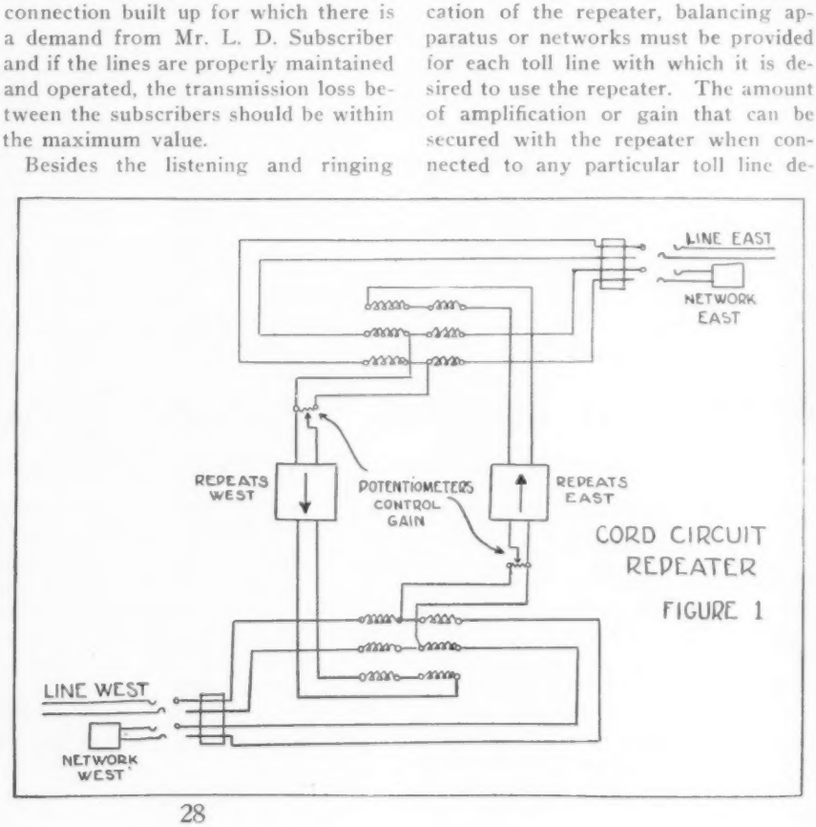
Comparing the present demands of Mr. Long Distance Subscriber with those of a few years ago, it will be noted that he now wishes to be able to talk farther and with an improved grade of transmission. To meet these requirements of Mr. L. D. S. there has been developed to a high degree the telephone repeater or vacuum tube amplifier.

The common variety of repeater contains two vacuum tubes associated with suitable apparatus to provide two-way transmission, since a vacuum tube will amplify only in one direction. By equipping a pair of toll cords with two vacuum tubes and associated apparatus, we have what is called a cord circuit repeater which may be used to connect two toll lines together, similar to the way in which the ordinary toll cord is used. A repeater that is connected in a toll circuit permanently instead of being connected to the circuits by toll cords is known as a through-line repeater.

Having these devices available for boosting the volume of transmission and thereby extending the talking range, the next logical step is to set up a transmission standard for all long distance connections. This standard provides a maximum limit which the transmission loss between two subscribers should not exceed, so that with average voices and hearing they can converse readily by paying a little closer attention than they would ordinarily on a local call. Now by installing the cord circuit repeaters at the proper toll switching points, the toll lines can be connected together through the repeater cords and any connection built up for which there is a demand from Mr. L. D. Subscriber and if the lines are properly maintained and operated, the transmission loss between the subscribers should be within the maximum value.

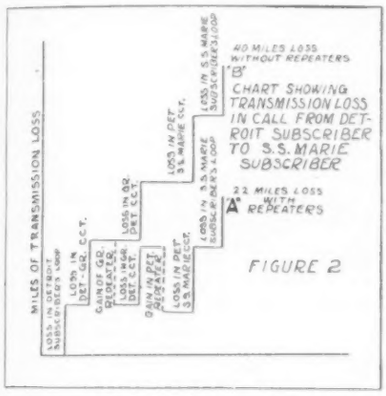
Besides the listening and ringing keys, the repeater cords have a special sliding key called the operator's control key. This key has five positions, marked 0, 1, 2, 3 and 4. With the key on position "0," the amplifying part of the repeater is inactive and the cords operate as an ordinary pair of toll cords, while with the key on position "1" the repeater boosts or amplifies a small amount and correspondingly larger amounts on steps "2, 3 and 4." When the listening key is thrown to the talking position, the amplifying part of the repeater is inactive, regardless of the position of the control key, and the operator's set is connected to the cords for talking. This operation of the listening key will greatly interfere with the conversation of the subscribers, due to the repeater being cut out of the circuit and the consequent reduction in volume, while operation of the listening key to the monitoring position will permit the operator to listen in without affecting the operation of the repeater and, therefore, will not interfere with the subscribers' conversation.

In order to secure two-way amplification of the repeater, balancing apparatus or networks must be provided for each toll line with which it is desired to use the repeater. The amount of amplification or gain that can be secured with the repeater when connected to any particular toll line de-



pends on how well the network and line balance each other. The proper step on which to set the operator's control key is indicated for each toll line on the designation strip and the operator should observe this marking when building up the connection, otherwise the repeater may "howl," or give poor quality in case the control key is set too high, while the transmission loss between the subscribers may exceed the standard limits if the key is set too low.

Figure 1 shows a simplified circuit of the cord circuit repeater. It will be noted that the repeater cords are double cords connected to double plugs, also that the repeater jacks are double, the upper one connecting to the toll line while the lower connects to the network for that line. The squares with the arrows are the amplifying parts of the repeater, one amplifying in each direction as indicated by the arrows. The operator's control key is connected by relays to the


MILES OF TRANSMISSION LOSS
40 MILES LOSS WITHOUT REPEATERS
'B'
CHART SHOWING TRANSMISSION LOSS IN CALL FROM DETROIT SUBSCRIBER TO S.S. MARIE SUBSCRIBER
22 MILES LOSS WITH REPEATERS
'A'
FIGURE 2

potentiometers, which are operated by moving the key, thereby changing the amount of the gain or amplification.

Figure 2 is a chart showing the total transmission loss between subscribers in Detroit and Sault Ste. Marie. Curve "A" illustrates the transmission loss if repeaters are properly used at Grand Rapids and Petoskey, while "B" shows the loss if the repeaters are omitted. The dashed lines show the gains given by the Grand Rapids and Petoskey repeaters. The net result of using these repeaters is similar to shortening the line, thereby decreasing the transmission loss by an amount equal to the gain given by these two repeaters. Without the repeater the total transmission loss is 40 miles of standard cable, which is considerably above the limit for satisfactory transmission, while with the repeaters the loss is 22 miles, which would give a very good grade of transmission.—D. H. Baker in The Mouthpiece.

Thedford, Neb.—C. T. Shaw has bought the Thedford telephone plant from Frank Feree.

HOW MANY MILES PER GALLON?

How many miles per gallon of gasoline should you get from a Ford trouble car? From a heavy construction truck? The Indiana Bell Telephone Company has been trying to find out and, incidentally, has been trying to improve the average. In each month's issue of Bell Telephone News, the employee's magazine of the company, is printed the record for each company car. These are classified by kinds of cars and by divisions of the company's territory. The first table was published in May, covering operation of cars during the month of March. The November issue of Bell Telephone News contains the results for September. The following table has been compiled from the published figures giving some interesting comparisons:

Type of Car	Miles Per Gallon						
	March	April	May	June	July	August	Sept.
Ford roadsters	13.4	13.9	15.3	15.6	16.6	18.8	17.3
Ford tourings	12.4	16.0	14.5	14.1	17.1	17.3	17.4
Dodge tourings	10.8	11.2	11.7	11.4	10.1	11.3	11.7
Ford roadsters, slip-on body	12.5	13.3	14.0	14.7	15.2	16.2	15.8
White trucks, ¾-ton	7.9	9.0	9.2	9.4	9.8	8.2	9.7
G. M. C. trucks, ¾-ton	6.7	7.5	7.7	9.7	9.3	9.3	8.5
Republic trucks, 1-ton	6.6	5.4	5.1	4.8	7.8	7.9	...
Ford trucks, 1-ton	9.4	9.2	14.4	9.6	10.2	10.2	10.2
G. M. C. trucks, 1-ton	5.2	6.8	5.4	9.5	6.1	8.3	5.6
G. M. C. trucks, 1½-ton	5.1	5.5	5.3	5.7	5.5	5.1	4.2
White trucks, 1½-ton	5.1	5.6	5.7	6.9	6.7	7.1	7.3
White trucks, 2-ton	4.4	5.2	4.5	6.3	5.5	7.3	6.1

The figures for the Ford cars are the most reliable, as results of operation of over 125 cars are included. The figures for Ford 1-ton trucks include about forty trucks, and for the other types from one to eleven trucks of each type. No data as to age is given, and where fewer trucks of a given type are in use the results may vary.

Indiana has a considerable mileage of hard surfaced roads, but by far the greater part of the roads are gravel, so that operating conditions are fairly uniform over the entire state, except for the Indianapolis city division, where the cars operate for the most part on city streets.

The general improvement in results shown in the latter months covered by the table may be accounted for in part by better road conditions in summer than in spring, but probably a greater part is due to increased attention to the condition of the car on the part of the employee driving it. It may be noted from the detail figures that the improvement is less marked in the Indianapolis division, where the cars are cared for in the company garage, than in the other divisions of the state, where more responsibility for the upkeep of the car is taken by the driver.

CREOSOTE TREATMENT PREVENTS DAMAGE

A conservative estimate of the losses caused by insects to forest products is $45,000,000 annually, says T. E. Snyder, entomologist of the U. S. Department of Agriculture, in Wood Preserving News. The results of tests by the Federal Bureau of Entomology for the past ten years have proven that coal tar creosotes are the most effective preservatives for timbers in protecting them against attacks by wood-boring insects, particularly termites, or "white ants." Impregnation by the pressure process renders wood resistant to attack by termites for at least twenty-five years. Impregnation by the open tank method, if carefully done, renders the wood resistant for at least fifteen years. Brushing several coats of coal tar creosote on timber will add two to five years of life.

THE MAN WHO DOES THE WORK IS THE BEST ACCOUNTANT

"No one but the man who actually does the work can accurately say how time and materials are used," says Chester R. Ives in the Northwestern Bell. Taking for example, the installer, when he is making a new installation, both materials he uses and his time must be classed as new investment. If inside wiring from a previous installation is found and reused he must so report it on his time sheet if the records are to be made accurately. Perhaps, in connection with his work on the installation, some repair work is necessary. His report must show this.

The wire chief, foreman, lineman, the cable splicer and all other members of the plant crew are the actual originators of the company's records in that they report what additions have been made to plant and what expense is required to keep it in good condition. From these records are outlined future policies in regard to future construction and maintenance and the company must depend to a large extent upon them for the determination of the plant investment and the amount required to maintain it.

The plant man must use every precaution to see that he pro-rates the charges to each code properly. He must know the amount of time put on each job and must know the classification under which each job comes. He is both a craftsman and an accountant.

Practical Plant Problems

Chapter XIV—Financing Plans

By CHARLES W. MCKAY, Associate Editor*

The problem of obtaining funds for plant extensions and betterments is one that has been harassing executives of Independent telephone companies for many a month. In fact, the problem has never been a simple one—for either large or small Independent companies. In the past, however, the large companies have found ways and means—especially with the assistance of the Bell interests—for obtaining needed funds, but the "little fellow" had a well nigh hopeless task—unless he was fortunate enough to have a good angel behind him, in the form of a local banker—or to be supported by an exceptionally strong state association.

As previously suggested, this whole problem has been given a great deal of thought during the past year. As a matter of fact, as I write this article I have before be a copy of TELEPHONE ENGINEER for November and at page 32 I note the caption "State Chiefs Talk Finance."

Is there any reason why it should be so much harder for a telephone company—be it large or small—to obtain the necessary funds for so maintaining its plant as to render good service than it is for, let us say, an electric light or gas company? In the writer's opinion there is no real reason why the telephone company should be harder to finance, in fact it should be easier.

It is the writer's purpose in this article to try to reduce the problem to its fundamentals. You, we will say, are the owner (or at least the executive officer) of a moderate sized telephone company—giving service in an average telephone community. In other words, you have a certain number of "city" subscribers and a certain number of rural subscribers. Let us assume that your plant was built about twenty-five or thirty years ago—at the time the wave of Independent telephony swept the country. Perhaps you had a very good plant at that time—the poles were in good condition and of good timber; the wire was of high grade (perhaps much of it copper wire); perhaps you even also had a certain amount of underground conduit and cable and an appreciable amount of aerial cable—in your outside plant. We may further assume that your central office equipment was of excellent make and that your instruments were equally good. Subsequent to the original installation you have, of course, made replacements and extensions—but it is quite probable that a large amount of the old plant still remains in service. You probably have a number of the original instruments (although they may have been rebuilt several times); you may have a large amount of your original wire installation (if the wire was copper), and you may even have a portion of the original central office installation. In connection with the latter—the central office equipment—a remark once made to the writer by one whom you all know—Mr. Samuel B. McMeen—is rather interesting. In talking over the average life of a telephone switchboard McMeen said, "If the board is reasonably well maintained—make the longest guess you can possibly make as to how long it will last and then add ten years to your guess." Mr. McMeen had seen so many old boards that had been rebuilt that he laughingly took it for granted that the life of a magneto telephone board is almost indefinite.

As a matter of fact, there are so many replaceable parts on a magneto board that, from the standpoint of physical depreciation, the life is almost indefinite.

In the hypothetical case we are considering we have assumed that there is a certain amount of aerial cable and a small amount of underground cable and conduit. The life of good aerial cable (by this I mean the actual life from the standpoint of physical depreciation and not the average life—which takes into consideration functional depreciation) is very long—much longer than most of us would be willing to admit, when we look at the problem from the standpoint of the problem of accumulating reserves for depreciation.

Now we have before us a typical telephone plant located in a typical telephone community. We have some new cable and some old cable; we have some new conduit, encompassing underground cable—and some old conduit; we have quite a large number of new telephone instruments—but an appreciable residue of the original installation; we have some new wire and possibly quite a large amount of old copper wire; we have a central office equipment, which, to use a homely expression "has just grown like Topsy"—in other words, it has been added to from time to time, a portion of the original installation remaining, while the "tout-ensemble" embraces a hodge-podge of new equipment, semi-new equipment, and very old equipment. The original pole installation is, of course, practically gone—although some of the poles may have been "set back" a number of times to make short sticks for rural usages and to make stubs.

Now looking at the problem from a financial standpoint—the time has come when we need money for a thorough rehabilitation of the plant. What are we going to do with (what some people would be unkind enough to call) the junk pile we have left? The answer is threefold:

1. Have a careful and systematic valuation made of the plant—with a view to determining the inherent residual values; the values of portions which may be retained and the scrap values of the portions which should be retired.

2. Have a careful engineering estimate made—first from the commercial standpoint to determine new business possibilities and second from the plant standpoint to determine the costs of plant replacements, extensions, and betterments.

3. Formulate all data as to possibilities for new business; the value of usable existing property and the scrap value of unusable property and the estimates of costs of replacements, extensions, and betterments into one concise report.

You will then have all data pertinent to the problem in question in such form that it may be analyzed easily. In connection with these data there

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*Mr. McKay is manager of the Valuation Division of The Roberts-Pettijohn-Wood Corporation, 646 North Michigan Avenue, Chicago, and Consultant on telephone engineering problems.

should be pertinent comments—in other words, a report, and finally a statement should be made up showing the value of the usable plant; the scrap value of the plant not usable; the estimated cost of new plant, and the derivation of funds for financing. A portion of these funds may be obtained through the sale of bonds (mortgages) while the remainder may be obtained through the sale of stock locally. A statement of this nature is shown in Fig. 1.

The amount of new financing raised through the medium of mortgages should not exceed much over 35% of the value of the property.

A sale of stock locally is most desirable in the case of any public utility. This plan was originated by Mr. Samuel Insull—one of the greatest (if not the greatest) public utility executive-financiers in the world. Years ago Mr. Insull realized that a wide distribution of stock was bound to re-act to the ultimate advantage of the companies in which he was interested. In the first place it accomplished the purpose of raising the money—but what was far more important, from Mr. Insull's standpoint, every stockholder (and most of the stockholders were subscribers to service) was a "booster." When a large number of people have money invested in public utility securities they are not apt to allow legislative action detrimental to the public utilities at large.

And so it is in your own case. If your stock is rather widely distributed throughout your town—the city council is not apt to be too hard on you in the way of municipal ordinances. Furthermore, if some dissatisfied subscriber—or group of subscribers—brings the matter of rates to the attention of the public service commission, you will have many boosters—and some of them powerful boosters.

The plan outlined hereinbefore is by no means new in the telephone field, but—to the best of the writer's knowledge and belief—it has not been exploited sufficiently. In the present article we have only touched upon the fundamentals of the plan, and the plan will be dealt with more in detail in a subsequent installment of this series.

STATEMENT OF PLANT ASSETS AND FINANCING PLAN

	Plant Assets			Derivation of Funds Necessary to Consummate New Financing			
Plant Accounts	Valuation of Property (Sound Values)	Additional Plant	Total Assets After Rehabilitation	Sale of 7% Bonds	Sale of 8% Stock	Paid in Surplus	Total
Right of Way—207	$ 2,300.00		$ 2,300.00				
Land—211	10,000.00		10,000.00				
Buildings—212	21,000.00	$ 1,000.00	22,000.00	‡$115,000.00			$115,000.00
Central Office Equipment—220	26,600.00	10,000.00	36,600.00				
Station Equipment—230	37,500.00	10,000.00	47,500.00				
Exchange Pole Lines—241	65,000.00	25,000.00	80,000.00		$225,000.00 (Old Stock)		225,000.00
Aerial Cable—242	25,000.00	25,000.00	50,000.00				
Aerial Wire—243	32,500.00	2,000.00	34,500.00				
Underground Conduit—244	7,800.00	10,000.00	17,800.00				
Underground Cable—245	9,000.00	11,000.00	20,000.00		‡$15,100.00 (New Stock)	None	15,100.00
General Equipment—260	5,300.00	10,000.00	15,300.00				
Materials and Supplies—122	3,100.00	6,000.00	9,100.00				
Working Capital	5,000.00	5,000.00	10,000.00				
	$240,100.00	$115,000.00	$355,100.00	$115,000.00	$240,100.00	None	$355,100.00

‡To be used for rehabilitation of plant.

Ben Woodbury Is Vice-President of Kellogg

Works His Way Up to Executive Position—with Kellogg Since 1905

The friends of Ben Woodbury will be glad to know that he has been appointed a vice-president of the Kellogg Switchboard & Supply Co.

Mr. Woodbury will make his headquarters in Chicago.

Mr. Woodbury is well known in the telephone field. His practical and consistent views on telephone exchange operating are known and appreciated by telephone men, whether they hold an all-around job in some village switching station or control the destiny of large companies. Mr. Woodbury's many years' experience, working along an optimistic, friendly and aggressive plan, has given him an acquaintance and knowledge of telephone exchange business in all its many departments and activities that has been equaled by few men.

"Ben" started in the telephone business with the Kellogg company as correspondent in 1905. He has been in constant "contact" with the spirit and progress of telephony ever since. As salesman he first traveled Minnesota and Wisconsin, later going to Ohio, where he formed the state sales organization that put Kellogg on the map in the Buckeye state. He was given the job of superintending the construction of the Columbus Kellogg warehouse and planning that organization, and in recent years has held the position of eastern division sales manager, his territory covering the New England states.

Ben Woodbury Now a Kellogg Vice-President

Mr. Woodbury said, when questioned regarding his widened sales efforts and plans, "Use—is the test."

C. Watts, Virginia Veteran, Dies at Staunton, Va.

Staunton, Va.—Newton C. Watts, president of the Clifton Forge Mutual Telephone Co. and of the Waynesboro Telephone Co., died at his home here, age 71. He was one of Virginia's best known telephone men, and a member of the Telephone Pioneers of America. He organized the Staunton company in 1895, and was active in the organization of telephone companies at Newport News, Lexington and Buena Vista. He also figured in the organizing of the Virginia and Tennessee Telephone Co., of which he was president for three years.

J. W. Jamison Appointed General Counsel, Southwestern Bell

St. Louis, Mo.—Joseph W. Jamison has been appointed general counsel of the Southwestern Bell Telephone Co., succeeding Claude Nowlin. Mr. Jamison retired as general attorney for the M. K. & T. Railroad in February, 1923.

Current Flow in Circuits

Laws Governing Passage of Current, Together with the Commonly Used Terms and Symbols—Various Types of Circuits Defined and Described—Also, Chapter on Sub-station Wiring

By P. Kerr Higgins

Substation Wiring

As a general rule in the smaller exchanges very little attention is paid to the proper wiring of the service drop and to the connections from the drop to the telephone set. In the opinion of the writer this is a serious mistake. The present practice in small exchanges, especially in rural communities, of installing the telephone in the least possible time with the least possible material is false economy and eventually becomes a source of trouble. The wires entering the subscriber's premises are really the most vulnerable part of the outside equipment and yet they are usually neglected.

When insulated drop wire is used it is extremely important that it be erected in a careful manner. When joints are necessary they should be staggered at least

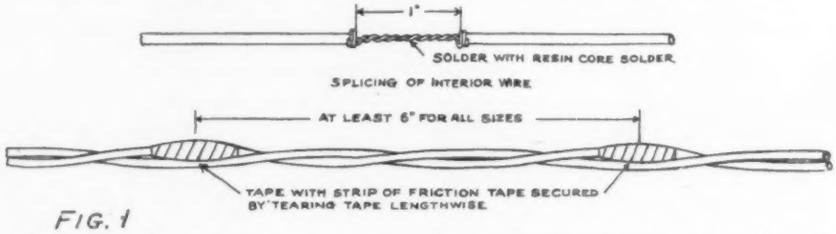
1"
SOLDER WITH RESIN CORE SOLDER
SPLICING OF INTERIOR WIRE
AT LEAST 6" FOR ALL SIZES
TAPE WITH STRIP OF FRICTION TAPE SECURED BY TEARING TAPE LENGTHWISE

FIG. 1

six inches apart, as shown in Fig. 1, properly soldered and taped and the splice made in such a manner that the strain will be uniform on both strands of wire. The method of entering the building is also important. The hole for admitting the wire should run upward, as shown in Fig. 2, and a loop commonly known as a drip loop should be left to permit the water to run off rather than to go into the building or to remain for any length of time on the wire at the point of entrance.

Where the protector is located on the pole and not on the premises it is found to be very convenient to install a connecting block or test block inside the building as shown in Fig. 3. The drop wire is usually of No. 17 gauge copper-steel, or copper-clad, the steel giving the strength and the copper the conductivity. The wires of the duplex are twisted and being of only No. 17 gauge will not stand very much strain or hard usage. The insulation gradually deteriorates and when it has reached a point where the wet weather affects the service, the wire must be replaced. Frequently it is necessary in running such a drop to carry the wire through trees and unless great care is exercised in the original installation of the wire and in its maintenance, damage will occur through abrasion. Rubbing against limbs tends to produce either leakage or a short circuit according to the nature of the damage.

Interior wire should be run carefully and insulated staples or perfection nails used to fasten same. The less fastening necessary the better and hence it is good practice to conceal the inside wire wherever possible to do so safely.

Some Definitions of Various Types of Circuits

Circuits are of two kinds: first, metallic circuits consisting of two wires with no connection to ground; second, grounded circuits having only one wire to the instrument and the other terminal at each end of the circuit connected to ground. A circuit is a path composed of one or more conductors joined together, through which current may flow. A circuit is said to be open when the line is broken or disconnected in any manner. A circuit is

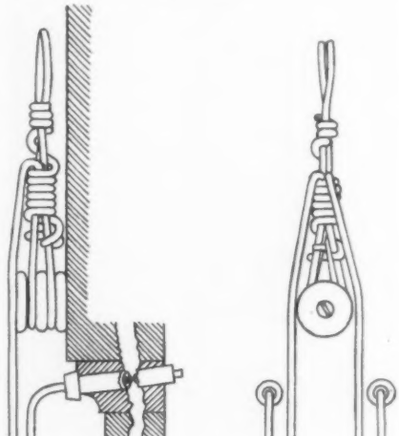

FIG. 2

said to be short circuited when its length is reduced by some shorter path, as for example, when the two sides are touching or crossed by a conducting substance. This applies only to metallic circuits. A circuit is said to be grounded when it comes in contact with the ground (earth) at some point other than where ground connections are normally made. A circuit having two or more branches is sometimes called a divided circuit and the branches are said to be connected in parallel. The wiring plan of a telephone instrument or of other telephone equipment is also referred to as a circuit. Series circuits are those that have their component parts connected up in series. Bridging circuits are those arranged in parallel.

Metallic or two-wire line circuits greatly reduce across talk or induction from adjoining wires. The two wires may be transposed when such exposure renders this practice necessary as in long lines thus effecting an additional reduction in disturbance. These transpositions are made at regular intervals, the intervals, depending upon the nature and proximity of the disturbing source. Grounded circuits sometimes give good results when constructed in territory free and clear of electric disturbance, but there must be no other wires in the vicinity close enough to produce inductive disturbance.

Laws of Current Flow in Circuits

Resistance is the obstacle which a circuit offers to the passage of the current. Conductivity is the opposite of resistance. It is the facility with which a conductor transmits the current. As the resistance of a circuit increases the conductivity decreases, or as the conductivity increases the resistance decreases. It is evident therefore that two conductors connected in parallel will conduct the current better than one alone, that is, their joint or com-

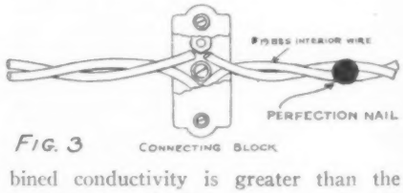

FIG. 3

bined conductivity is greater than the conductivity of either one alone. It also follows that the combined or joint resistance of two conductors must be less than the resistance of either single branch. If the separate resistances of the two branches are equal, then their joint resistance is equal to one-half of the resistance of one branch. When the resistances of the two branches are unequal the joint resistance is equal to the product

of the separate resistances divided by the sum of the separate resistances. For example it is desired to find the joint resistance of two wires, one having twenty-five ohms resistance and the other fifty ohms resistance. Multiply twenty-five by fifty and divide by twenty-five added to fifty. The result is sixteen and two-thirds ohms, the joint resistance.

If more than two branches or wires are used, then the joint resistance is found by reducing the respective resistances of the branches to fractions, having 1 for a numerator and divide 1 by the sum of the fractions. A resistance of two ohms represents a conductivity of one-half. A resistance of four ohms represents a conductivity of one-fourth and so on. It is apparent therefore that in order to find the conductivity corresponding to any given resistance, we should divide 1 by the resistance. In a similar manner the conductivity of one-half would represent the resistance of two ohms, so to find the resistance corresponding to any given conductivity, invert the conductivity. The joint conductivity is the conductivities of all the branches added together.

Where the branches have equal resistances, the current will divide itself equally between them. Hence, if a current of two amperes is flowing in the main circuit, then one ampere will flow through each of two branches of equal resistance connected to the main circuit. If, however, the branch resistances are unequal, then the current flowing in any branch may be determined by the formula $C = \frac{E}{R}$. In this formula E is the difference of potential between the points where the branches divide and where they again unite and R is the resistance of the branch under test. C is the current in amperes. It will thus be seen that the current divides inversely as the resistances of the branches.

The formula given will make known the current flowing in any branch circuit. The resistance of any branch is obtained by the formula $\frac{E}{C}$ and the fall of potential or the electromotive force between the dividing and uniting points in any circuit can be found by using the formula $C \times R$ which will give the electromotive force in volts. A thorough comprehension of this fundamental law known as Ohm's Law is of the utmost importance to every telephone man or student of telephony. These three equations form the basis of all electrical measurements and are indispensable to a proper understanding of circuits of every character; hence they should be carefully committed to memory. Recently it has become more common practice to use I instead of C as representing current in amperes.

Ohm's Law must be remembered in dealing with problems relating to current, resistance or potential. This may be done more easily by putting it into words as follows: "Voltage divided by resistance equals current."

If the current through the main circuit is desired the total resistance of the circuit and the total voltage applied to the circuit must be used. If the current through a branch or part of a circuit is desired the resistance of the portion of the circuit under consideration and the voltage or fall of potential across that part of the circuit must be used.

The above notations regarding Ohm's Law might be amplified to a very large extent, but it is believed that this is sufficient for the average reader at this time and other problems may be solved at a later date.

Commonly Used Terms and Symbols

As we are compelled from time to time in discussing telephone matters to use units or terms which to the uninitiated do not mean anything, it would seem advisable at this time to give the following definitions. These should be kept for reference.

AMPERE: The unit of current. An unvarying current of one ampere passing through a neutral solution of 15 parts nitrate of silver in 85 parts water will deposit silver at the rate of 0.00118 gram per second.

CENTIMETER: The unit of length in the CGS system. One centimeter is equal to .3937 inches.

CIRCUIT: The path followed by an electric current in its passage through a conductor from its starting point back again to point of beginning.

CIRCULAR-MIL: The unit of area in cross-section measurement of wires. It is the area of a circle, whose diameter is 1/1000". A circle of 1" diameter has an area of 1,000,000 circular mils and one square inch has 1,273,236.5 circular mils. To obtain circular mils, multiply area in square inches by 1,273,236.5.

The resistance of pure copper wire one foot long and one circular mil in cross-section at 75° F. is about 10.79 ohms and so the resistance of copper wire equals its length in feet multiplied by 10.79 and divided by cross-section in circular mils. The cross-section is found by multiplying its length in feet by 10.79 and dividing the result by resistance in ohms.

CONDUCTIVITY: Conductivity is the opposite of resistance, being the facility with which the circuit transmits or conveys the current.

COULOMB: Unit of quantity. One coulomb is the amount of electricity transferred in one second by a current of one ampere.

CROSS-TALK: See Induction.

CURRENT: The flow or passage of a quantity of electricity through a circuit. The rate of flow or the quantity of electricity passing through a circuit per second is expressed in amperes.

ELECTROMOTIVE FORCE: The force which tends to cause a current to flow in a circuit. Electromotive force is sometimes called electrical pressure.

FARAD: The unit of capacity. The capacity of a condenser which will be charged to a potential of one volt by one coulomb of electricity is one farad.

GRAM: The unit of mass in the CGS system. One gram equals .0353 ounces avoirdupois.

HENRY: The unit of inductance. If a current varying at the rate of one ampere per second induces into a circuit, an emf. of one volt the circuit has an inductance of 1 henry.

IMPEDANCE: (1) Opposition to flow along a circuit due to the apparent resistance and reactance. (2) The combined effect of all factors offering opposition to the flow of current in a circuit.

INDUCTION: This term is commonly used to mean the production of a current in one circuit due to the presence of a current on another conductor. If the distributing wire is a telephone circuit the induction is called cross-talk. The induced emf. depends on the strength of current in the disturbing wire, on its rate of change, on the kind of material, on the space between the wires and the distance between them, and upon the position of the return circuit.

JOULE: The unit of work. One Joule is the work done in one second by a current of one ampere under a pressure of one volt. It is the work done in moving .74 pounds a distance of one foot.

KILO-WATT: One thousand watts.

MAGNETIC INDUCTION: Iron placed in a magnetic field becomes magnetic by induction and the number of lines passing through it is different from the number of lines of force formerly present in the same space. If the number of lines is greater as in iron, the material is said to be "Paramagnetic." In a few substances the number of lines is found to be smaller and the substance is said to be "diamagnetic." The number of lines passing through at any point per square centimeter of cross section is the measure of magnetic induction.

MAGNETIC LINES OF FORCE: A magnetic field is usually shown graphically by radiating lines whose direction is everywhere that of the magnetic force. The magnetic field can be mapped by placing a white paper over a magnet and dropping iron filings on the paper. The positive direction of lines of force is that along which a north pole would tend to move.

MAGNETIC PERMEABILITY: The ratio between the number of magnetic lines per square centimeter and the magnetizing force per square centimeter. It is a numerical quantity. This ratio differs

for different qualities of iron and in the same iron for different flux densities, hence the permeability of iron is not a constant. The higher the permeability, the less is the magnetic resistance. The permeability of air and most substances except iron is taken as I.

MAGNETIC PROPERTY OF IRON: Iron and steel favor the conduction of magnetic lines of force and are spoken of as "magnetic materials." If copper wire be wound around an iron core in the form of a helix and current is passed through it, the core has magnetic lines running lengthwise through it. This phenomena takes place without an iron core, but the use of the iron greatly intensifies the effect.

MEGAVOLT: One million volts.

MEGOHM: One million ohms.

MICROFARAD: 1/1,000,000 of a farad.

MILLIAMPERE: 1/1,000 of an ampere.

OHM: The practical unit of resistance. It is the resistance offered to an unvarying electric current by a column of mercury. 14.4521 grams in mass, of a constant cross sectional area and length 106.3 centimeters; the temperature being that of melting ice. An electromotive force of one volt will cause a current of one ampere to flow through a resistance of one ohm.

REACTANCE: The opposition to flow of a varying current produced by presence of an inductive coil or a condenser in a circuit. In a simple harmonic current circuit, the square of the reactance added to the square of the resistance gives the square of the impedance. In an inductive circuit it increases as the frequency of the current increases, while in a capacity circuit it decreases as frequency increases.

RESIDUAL MAGNETISM: When a magnetizing force has been applied to a magnetic substance and then completely withdrawn, the magnetism remaining is known as residual magnetism. It is less when the magnetizing force is withdrawn suddenly than when it is withdrawn gradually. It may be reduced greatly or completely destroyed by applying a magnetizing force in the opposite direction. A familiar case of trouble, sticking armatures in ringers is caused by residual magnetism.

RESISTANCE: That property of an electric conductor which opposes the passage of an electric current. It is expressed in ohms.

SECOND: The unit of time.

SELF-INDUCTION: The production of an emf. in a coil of wire due to changing magnetic field cutting the turns of the coil itself. This emf. is proportional to the rate at which the current in the coil is changing.

STATIC INDUCTION: Electric charges produced by presence of other charges on the earth or on nearby bodies.

VOLT: The practical unit of electromotive force. It is $\frac{1000}{1434}$ of the emf. between the poles of a Clark cell at 15° Centigrade. An emf. of one volt will cause a current of one ampere to flow through a resistance of one ohm. An emf. of one volt is induced in a conductor by cutting one hundred million lines of force per second.

VOLTAGE: Another name for potential difference or electromotive force (emf.) expressed in volts.

WATT: The unit of power. It is the power expended in doing work at the rate of one Joule per one Second. A current of one ampere flowing between points having a difference of potential of one volt will produce 1 watt.

Symbols and Letters

-|[|- Battery of two cells. The long stroke indicates positive element and the short stroke the negative element.

-| |- or —[ ]— Condenser.

R—Resistance.

W—ohm, the unit of resistance, e. g., 10 w means 10 ohms.

V—Megohm.

C—Current in amperes (I is used more commonly than C in recent years).

E—Electromotive force in volts.

K—Capacity (in recent years C is used more extensively than K to represent capacity).

KR—K multiplied by resistance (Preec's law of telephone transmission).

Mf—Microfarad.

Z—Impedance (The square of induction plus square of resistance).

F—Fahrenheit temperature scale.

C—Centigrade temperature scale.

B—Induction per square centimeter.

Eugene A. Reed, Ohio Bell Head Dies at Columbus

Columbus, Ohio.—Eugene A. Reed, president of the Ohio Bell Telephone Co., died here following an operation. Mr. Reed was born in Boston in 1871. He entered the service of the American Telephone & Telegraph Co. in 1894, following his graduation from the Harvard School of Law. His first work was in the long-distance department of the Bell at Boston as assistant chief operator. He advanced to assistant superintendent's position in the Boston district. In 1899 he was transferred to New York. In November, 1903, he was sent to the Ohio Bell's predecessor, the Central Union, as superintendent of the Ohio division. In June, 1911, he became general plant superintendent of the Central Union, with headquarters in Chicago. As general manager of the Central Union and the Cleveland Telephone Co. he returned to Columbus in July, 1912, and later resigned his Cleveland connection to concentrate upon his Central Union duties. Mr. Reed was elected vice-president and director with the Cleveland Telephone Co. in January, 1920, and when the Ohio Bell absorbed the Cleveland property he became vice-president of the Ohio Bell. When the Bell-Ohio State merger was made, Mr. Reed was named president of the consolidation. He was prominent in the industrial and social life of Columbus.

The Bell system has 8,000 motor vehicles, of which approximately 3,000 are trucks from one-half ton to five-ton capacity.

Overhead wires of the Bell system are carried on more than 15,000,000 poles. 600,000 poles are required each year. A million pole holes a year are dug for the Bell system.

Auburndale, Wis.—The Auburndale Telephone Co. has purchased the Sherry Telephone Co. plant.

Carthage, Ill.—J. L. Kirk, owner of the telephone company at Arcadia, Fla., has bought the controlling interest of O. F. Berry in the Mississippi Valley Telephone Co.

Milan, Tenn.—According to present indications the Gibson County Telephone Co. system will be completed by January 15.

Indianapolis, Ind.—New bulletins detailing Prest-O-Lite battery service to motorists and industrial users, and also describing the service on the small gas tanks used for soldering and brazing, have been issued by Prest-O-Lite Co.

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Setting a pole in the hillside with the aid of a White truck and winch

Truck and Telephone, Allies

With Tough Territory for Construction Work the Chesapeake and Potomac Solves Problem with Sturdy Fleet and Notable Maintenance Methods—Labor Saved

By J. W. Spaulding*

Logan is a little mining hamlet in West Virginia. Nestling in a secluded valley and surrounded by the timbered slopes of the Blue Ridge, it is far removed from the great outside world of business and industry. In many ways it is completely isolated. True, there is a railroad—a branch line—but trains are few. Roads are little more than trails winding around the mountains and are virtually impassable the greater part of the year. But with all its physical isolation, Logan has one avenue of communication—the telephone. Over mountains and through valleys, bridging rivers and stretching on straight as the crow flies, run the lines of the Chesapeake and Potomac Telephone Company, linking the people of Logan, despite its isolation, with the whole wide world.

Logan is typical of many other towns served by the Chesapeake and Potomac Telephone Company throughout Maryland, Virginia, West Virginia and the District of Columbia. The construction of thousands of miles of pole lines linking this vast territory and the maintenance of these lines has been no ordinary task, but one that calls for the best in the way of engineers, tools and equipment. In its construction work, the company utilizes, in addition to other motor vehicles, a fleet of 141 trucks. This fleet has contributed to a large extent toward the success of the Chesapeake and Potomac in speeding up construction and maintenance work and in cutting operating costs.

Where Roads Are Nil

The work the Chesapeake and Potomac Telephone Company imposes upon its truck equipment is most severe, in that a large portion is carried on in the mountainous regions of Virginia and West Virginia, and other sections where roads are exceedingly bad, with grades so steep that only truck equipment of the highest quality is able to stand up and keep going. While in its construction work the company strives, of course, to follow roads, it frequently finds it necessary to adhere to the rule that a straight line is the shortest distance betwen two points. If it is necessary for construction gangs to strike across country to maintain that straight line, across the country they go, even in defiance of mountain slopes.

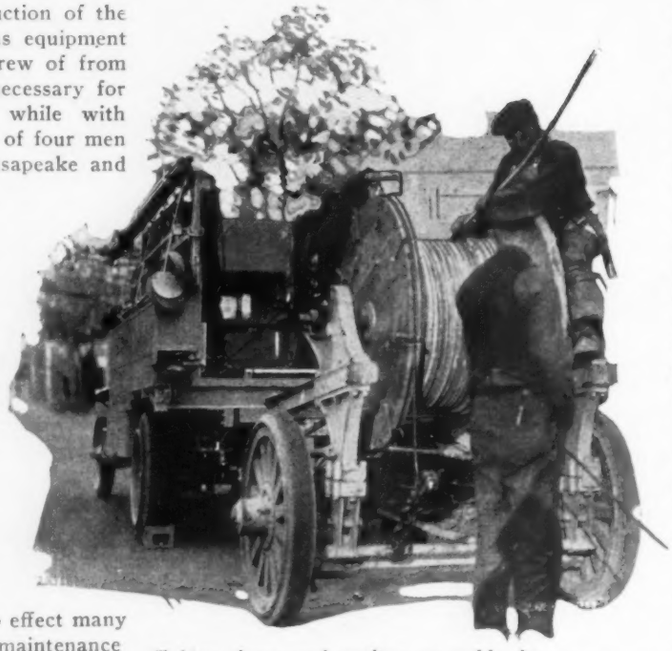
In a way, construction of a pole line over a mountain is similar to the construction of a tunnel, in that the gangs work from both sides simultaneously, joining the line in the center or at the top of the mountain.

The Chesapeake and Potomac was among the first telephone companies to recognize the value of winch and pole derrick equipment on a motor truck. Next to the truck itself, the winch constitutes the greatest contribution of the truck manufacturer to the telephone industry, according to Chesapeake and Potomac officials. "In fact," one of the officers declares, "the modern motor truck has completely revolutionized line construction and maintenance work for telephone companies."

*Mr. Spaulding is one of the White Company's industrial transportation authorities.

Previous to the introduction of the winch and pole derrick as equipment for telephone trucks, a crew of from seven to nine men was necessary for line construction work, while with winch and derrick a crew of four men is sufficient, and the Chesapeake and Potomac Company reports that some of its crews, with these modern tools at their command, have more than doubled their efficiency. Men with winch and derrick do from two to three times the work accomplished before these labor-saving and time-saving devices were brought out.

By operating trucks of only a few makes, the Chesapeake and Potomac Telephone Company has been able to effect many economies and cut truck maintenance costs tremendously. One item alone, is especially noteworthy. When trucks of all makes were operated, the company found it necessary to carry an unusually large stock of parts, but working along the line of standardization the parts inventory has been reduced over 70 per cent.



Taking down and reeling up cable for shipment, using a White 2-ton truck and winch line to turn the reel

C. & P. Service System

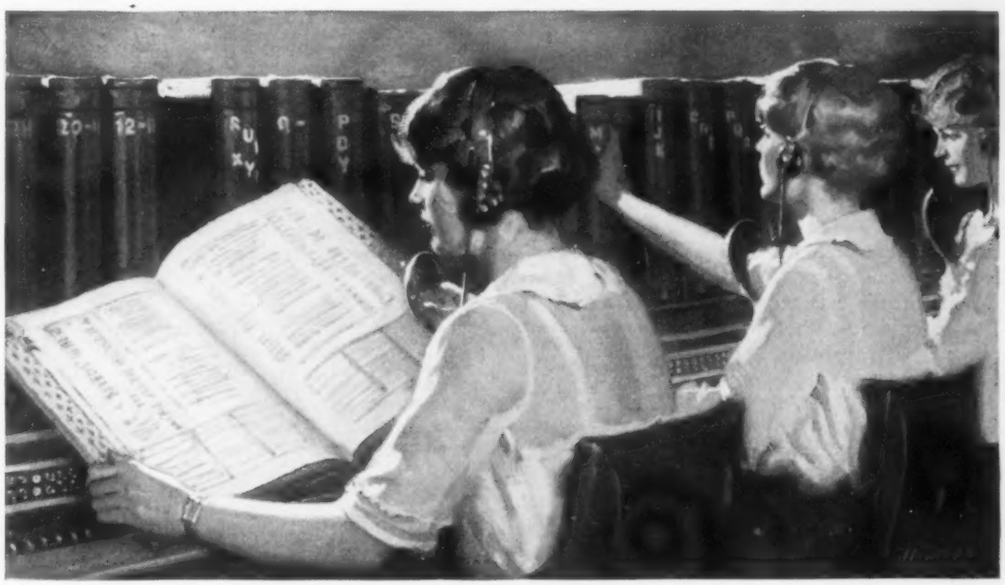
The system employed by the Chesapeake and Potomac Company in servicing its big truck fleet is decidedly interesting. With skilled mechanics under intelligent supervison it is exceptionally efficient and an important factor in the economical and dependable performance of the trucks in the company's service.

A feature of the truck maintenance system is a unit repair base at Washington, D. C., established about four years ago. At the unit repair base is carried a stock of parts and completely assembled truck units. In addition, service stations carrying stocks of parts are located at strategic points throughout the territory in which the company operates. Service stations are maintained at Norfolk, Richmond, Roanoke, Charleston, Huntington, Wheeling, Hagerstown and Baltimore. This complete maintenance layout keeps the trucks on the road. Therein lies the secret of truck efficiency.

Keep Trucks Rolling

Obviously, to get the greatest work out of a truck it must be kept rolling; and in accomplishing that object the Chesapeake and Potomac Company has been eminently successful. A "C. & P." truck is never off the road for more than a day, and rarely for that length of time, with the exception of the time it is in the shop for a general overhaul. Minor repairs are made at the service stations or on the road. Even should a more serious repair—one that might take considerable time—be necessary, due to an accident, the chances are the truck would again be on the road the next day. It is here that the advantage of a unit repair base manifests itself. A telephone call goes to the unit repair base at Washington, and a complete unit, such as a motor or rear axle, is on its way by express on the next train. On its arrival at one of the service stations a crew works at night, if necessary, installing the new unit, and the truck is again ready for service with the rise of the sun. The damaged part is then repaired in one of the company's shops, but meanwhile the truck keeps rolling.

It is the policy of the company to keep its trucks in first-class working condition at all times and equipped with up-to-date labor-saving devices. The company builds all truck bodies in its own body shop and considers its bodies about the last word in efficient design.

New Haven, Ind.—V. J. Fisher has been made manager of the Home Telephone and Telegraph Co. plant here. W. E. Bowers, former manager, has been transferred to headquarters at Fort Wayne, Ind.

Crossroads of Conversation

Could the telephone directory in the hands of each subscriber be revised from hour to hour, there would be no need for the information operator. But the directory cannot at one time list all subscribers. Even during its printing and binding, thousands of changes take place in the telephone community. New subscribers are added to the list. Old ones move their places of business or of residence.

Though their names are not listed on the directory, these subscribers must be connected by the highways of speech with all others in the community. To supplement the printed page, there must be guides at the crossroads of conversation.

Such are the information operators, selected for their task because of quickness and accuracy, courtesy and intelligence. At their desks, connected with the switchboards in central offices, they relieve the regular operators from answering thousands of questions about telephone numbers that would otherwise impede the rendering of service. If they are asked for numbers already in the directory, service is retarded.

"Information" stands for the most complete utilization of telephone facilities.

"BELL SYSTEM"
AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES
One Policy, One System, Universal Service, and all directed toward Better Service

District Meeting in Nebraska Hear Subscribers' Views

Holdrege, Neb. — Representatives from 25 exchanges in southern Nebraska met here in practical sessions devoted to the general improvement of telephone service by the connecting companies. Operating demonstrations, motion pictures of telephone equipment manufacture and a series of brief talks by prominent Holdrege business men featured the meeting. A short talk was also given by A. W. Forbes, secretary of the Nebraska Telephone Assn. The afternoon program consisted of interesting and instructive talks and discussions regarding telephone affairs. R. L. Keester, president of the Farmers & Merchants Telephone Co., with headquarters at Alma, Neb., expressed the sentiment of all present when he explained the necessity of all telephone companies co-operating closely in all their relations with each other, in order that the public will receive the best possible telephone service. Dr. W. A. Schreck, president of the Bertrand Telephone Co., and A. Gaddis, president of the Beaver City Telephone Co., also spoke.

Western Electric Organizes Supply Department Advertising

New York, N. Y.—Removal of the general sales offices of the supply department of the Western Electric Co. to the Pershing Square Building, 100 East 42d street, New York, is announced. This change is brought about by the physical separation of the supply department from the telephone manufacturing end of the business. Herbert Metz has been appointed advertising manager of the supply department, with offices at Pershing Square. P. L. Thomson continues as publicity director of the Western Electric Co. Mr. Metz joined the company on graduation from Penn State College in 1914, starting in the commercial student course at the company's plant in Chicago. The following year he entered the advertising department in New the West, and in 1921 was appointed York, supplemented that work by a year in field sales promotion work in power and light sales manager.

Rice, Holmes and Dodd Advanced by Western Electric

Chicago, Ill.—C. L. Rice, formerly production superintendent, Hawthorne Western Electric Works, Chicago, and S. S. Holmes, general superintendent, Installation Department, have been promoted to assistant works managers at Hawthorne. R. C. Dodd, operating superintendent, Hawthorne Works, has been promoted to assistant works manager at the new Kearny (N. J.) Works, effective March 1, 1924.

Rotarians Promise Better Rates —Get Improved System

Russellville, Ark.—Learning that J. E. Armstrong, manager of the Russellville Telephone Co., was planning to spend $10,000 in plant improvements, a committee from the local Rotary club called on the telephone executive, endorsed the improvements and suggested that patrons would stand a raise in rates if a "real telephone system" were installed. Manager Armstrong has revised his plans, and probably will spend $35,000 in improvements.

Col. A. H. Griswold Made V. P. of Southern California

Los Angeles, Cal.—Col. A. H. Griswold has been named vice president of the Southern California Telephone Co. Mr. Griswold was plant engineer for the Bell on the Pacific coast for many years. In 1917 he assisted in organizing and training the 411th Battalion, Signal Corps, which was ordered overseas in January 1918. Col. Griswold was appointed director of telephone and telegraph services of the A. E. F. soon after his arrival in France. Following his army service he returned to France as representative of the Bell in assisting the French government in restoring its telephone service. In March, 1921, Col. Griswold was appointed assistant vice president of the American Telephone and Telegraph Co.

J. L. McQuarrie, W. E. Engineer, on Japanese Reconstruction

New York, N. Y.—J. L. McQuarrie, assistant chief engineer of the International Western Electric Co., left New York on Saturday, November 24th, for Tokyo, Japan, where he will aid in the solution of Japan's telephone problem. The earthquake destroyed sixteen exchanges and 82,000 telephone lines. Mr. McQuarrie will consult with officials of the Nippon Electric Co., a firm associated with International Western Electric. Despite severe damage, the Nippon company resumed operations promptly. It manufactures switchboards and telephone equipment.

"Home Phone News" Keeps Fort Wayne Family Informed

Fort Wayne, Ind.—"Home Phone News" is being issued monthly for the employes of the Home Telephone & Telegraph Co. The News is a four-page monthly, with a page size 6½ inches wide by 8½ inches high. It chronicles the personal items of interest among the Home employes and gives them an idea of the scope of the company's activities. The material is handled in an ideal way for a publication of this character, being intimate, entertaining and instructive.

New York to Install Message Registers on Rental Basis

New York, N. Y.—New York Telephone Co. has made an amendment to its schedule of telephone charges, whereby message registers at subscribers' stations are made available at a rental of 75 cents a month a station. Installation of such registers is made contingent on the physical conditions at the Central office and the subscribers' stations as well as on manufacture and supply of the registers and the availability of the related equipment. Use of these registers is available only in manual central office districts where business individual line message rate is quoted.

Sun Asks Commission O. K. on Sale to Cumberland

Nashville, Tenn.—Approval of the sale of the properties of the Sun Telephone Co. to the Cumberland Telephone and Telegraph Co., has been asked of the state railroad and public utility commission. The agreement between the Sun and Cumberland companies sets out that the properties of the Sun company are to be purchased at $155,740, the properties of the Southern company at $90,000 and the properties of the Stantonville company, a Tennessee corporation, at $14,-260.

Babcock Sues for 870,000 Shares of Telechronometer Stock

Everett, Wash.—Garrison Babcock, through his attorneys, has sued William N. Winter, president of the Puget Sound Telephone Co., to recover 870,-000 shares of stock of the Telechronometer Co., with a par value of $870,000. The complaint alleges that Winter's reversal of attitude toward the Telechronometer Co., as detailed in the complaint, constitutes failure to keep the contract with the plaintiff, and that 870,000 shares of Telechronometer Co. of America common stock held by Winter rightfully belongs to Babcock.

Charles P. Cooper Advanced to Ohio Bell Presidency

Cleveland, O.—Charles P. Cooper, former vice-president and general manager of the Ohio Bell Telephone Co., now is president of that company, having been advanced following the death of the late President Eugene A. Reed. Randolph Eide, general superintendent of traffic was named general manager.

Crandon, Wis.—Charles Kapke, Mrs. Irene Kapke and R. F. Konutz have bought the Crandon Telephone Co. Mr. Kapke, who has been superintendent of the Badger State Telephone Co., Niellsville, will be manager and treasurer at Crandon.

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Strowger Automatic in Berlin

2,000-Line Trial Marked Success

Berlin, Germany.—Strowger automatic telephone equipment for the entire multi-office area of Berlin has been decided upon by the German postoffice, following the successful trial made of a 2,000-line installation in one of the suburban exchanges.

Thus Berlin announces its conversion to full Strowger automatic shortly after the news of the London adoption of this equipment was made public.

Installation at Berlin will be begun soon and the work will advance as rapidly as engineering and economic conditions will permit.

Strowger automatic equipment is not a new thing in Germany. Telephone men in the United States have of necessity been so intent upon their own problems that the great development of automatic operation in the German republic has perhaps escaped the notice of many of them. It is somewhat of a surprise, therefore, to learn that not only are the telephone systems of many important German cities already fully or largely automatic, but also that many of the smaller towns are also equipped with Strowger exchanges.

The populous cities of Munich and Leipzig are each operating more than 30,000 lines of Strowger automatic equipment; Dresden has near 30,000 lines, while in such important centers as Hamburg and Stuttgart automatic installations have been proceeding rapidly. The former city is now operating some 16,000 lines, and the latter 10,400 lines, of Strowger automatic equipment. In fact some 50 cities of considerable size in the republic now have automatic service. There are, in addition, more than 100 of the smaller systems of "community automatic exchange" type now in use in the country.

It is not surprising, therefore, that with this background of successful experience in the operation of Strowger automatic in many parts of the republic, the German postoffice should decide upon the same equipment as the ultimate for the great capital city of Berlin.

The rapid development of Strowger automatic in Germany is remarkable when it is considered that it has practically all taken place in less than fifteen years, the greater part of that time under conditions that might have been expected to hamper or even seriously curtail new telephone construction. The Strowger automatic equipment used in Germany is manufactured, as the Berlin equipment will be manufactured, by the great German electrical firm of Siemens & Halske, A. G., licensed since 1909 under the patents of the Automatic Electric Co., of Chicago.

The equipment is the standard Strowger automatic system especially adapted to meet the requirements of the German postoffice, and is the same general type as the equipment manufactured in Chicago by the Automatic Electric Co., and also in their own factories by the Automatic Telephone Mfg. Co., Liverpool, England; Thomson-Houston Co., Paris, France; and by the Northern Electric Co., Montreal, Canada.

It speaks well for the economic and service value of Strowger automatic equipment that, in less than three decades, it has grown from small and more or less experimental installations in a few towns in the United States, to be the standard of telephone equipment and service in many of the great centers of the world, and has been adopted by the governments of a number of countries, as well as by commercial operating telephone companies.

Besides London and Berlin, Strowger automatic is the standard and is now in use in such cities as Havana, Honolulu, Buenos Aires, Manila, Melbourne, Sydney, Winnipeg, Edmonton, Harbin, and many others of world-wide importance outside the United States, while in this country the use of automatic is rapidly becoming so general in the cities that installations of large size are proceeding throughout the country constantly. To such an extent has automatic development proceeded here that there are now nearly 200 Strowger automatic exchanges in use or being installed in the United States.

Canadians Meet

Eighteenth Convention of the Dominion Independents Brings Together a Hundred

Toronto, Ont.—Growth of telephone business in the Canadian dominion was reflected at the eighteenth annual meeting of the Canadian Independent Telephone Assn., where a hundred representatives of the industry met in lively two-day session.

When the association was formed there were only a dozen companies represented. At the present time there are more than 700 Independent companies in Canada.

During the meeting the practical problems that confront the Canadian Independent companies were given intensive group study with the subject of insurance coming up for particular attention.

In their addresses, the president, Anson Groh, of the Waterloo Municipal Telephone System, and the secretary, A. Hoover, of the Home Telephone Co., Green River, both alluded to the changed conditions since the association was first organized. One of its main objects then was to fight opposition, but now the local systems were firmly established and recognized. The Bell Telephone Co., the secretary said, had apparently adopted a policy of confining its efforts chiefly to the cities and large towns, leaving the rural field to the local companies, which, by the way, served as feeders to the Bell Company in its long-distance calls.

An interesting discussion took place as to the practicability of insuring telephone systems. The question was mooted at the last convention, as during heavy sleet storms some of the systems were practically wiped out. F. E. Webster, chairman of the special committee appointed to go into the matter, reported that he had sent out a questionnaire to the different companies and practically all were in favor of some system of mutual insurance. The committee was instructed to gather further data on the matter, and was authorized to procure the service of an actuary with that end in view.

F. D. Mackay, chairman of the Legislative Committee, drew attention to the report that the Minister of Highways was refusing to meet the cost of removing telephone poles, consequent on alteration to a provincial highway, the Bell Telephone Co. being mentioned as the company which had presented a bill for this work, in accordance with an agreement made with the ex-Minister, Hon. F. C. Biggs. Much discussion resulted as to provincial and county responsibility for this work on the different roads, the general feeling being that the local companies should not have to bear the cost of a removal for which they had not been responsible. The Legislative Committee was instructed to deal with the matter.

In the evening of the first day's session the members of the Association were the guests at dinner of the independent telephone and supply manufacturers. The speaker of the evening was A. Monro Grier, K. C., who said that the telephone companies were performing real service in bringing men who might be far separated, within speaking distance of each other, and an extension of such facilities might help in no inconsiderable way in the prevention of misunderstanding between nations.

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Pennsylvania Announces Operators' Program

Harrisburg, Pa.—A telephone operators' traffic conference will be held in conjunction with the Pennsylvania annual state convention in the Penn-Harris Hotel, Harrisburg, Pa., on Thursday, Friday and Saturday, January 10, 11 and 12, 1924. This is going to be the most interesting conference of operators ever held in Pennsylvania. Miss Anne Barnes, traveling chief operator for the Iowa Independent Telephone Association, will conduct this conference. The following subjects will be discussed:

"The Patron, the Operator and the Company."

"Building and Clearing Toll Credits."

"How Does the Public Get an Impression of Our Service?"

"The Responsibilities of the Operator in the Small Office."

"The Responsibilities of the Operator in the Large Office."

"The Art of Satisfying the Public."

"The Average Operator's Problems."

"What Makes Public Service a Success."

Each of these subjects will be assigned to an operator.

Frank Bohn's Address on Utility Duty Made Newspaper Feature

Fort Wayne, Ind.—Indicative of the interest that the public has in public utility problems when presented with the patron's viewpoint paramount, the Fort Wayne News-Sentinel recently printed in full an address made by Frank E. Bohn, secretary and general manager of the Home Telephone & Telegraph Co. This address was delivered at a meeting of the Quest Club. Its interesting "close-up" of how the utilities are striving to serve their publics with the maximum of satisfaction and economy got much publicity.

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(Continued from Page 19)

together with results of tests on small, clear specimens of the species listed.

The above figures apply to green or unseasoned timber unaffected by decay and the poles practically free from defects at the ground line. They are the actual breaking strength to which "factors of safety" must be applied according to the judgment of the designer, taking into consideration the frequency of the assumed maximum hazard and the probable seriousness of failures.

"Dense" southern yellow pine as listed above refers to poles having not less than one-third summerwood and not less than six annual growth rings per inch as measured over the outer two inches of the radius of the butt end of the pole or, if the number of rings per inch is less than six, the proportion of summerwood must be not less than one-half. "Sound" southern yellow pine refers to poles failing to pass such a specification, or without reference to such a specification. "Dense" Douglas fir is defined the same as "dense" southern yellow pine above, and "not dense" the same as "sound" southern yellow pine.

Modulus of rupture is the computed maximum stress in the pole at the maximum load. The point at which this maximum stress occurs depends on the taper of the pole. If the taper is such that a diameter of one and one-half times that at the top reaction corresponding to the point of attachment of a single cross-arm, or to the point where the pull of the wires is centered when more than one arm is used, is found above the ground line then the maximum stress is at this point of one and one-half diameters. When the taper is less than this the maximum stress is at the ground line.

In determining the strength of poles the author mentions the possible use of "maximum fiber stress at point of failure" instead of "modulus of rupture." Data are presented to show that there is practically no difference between the modulus of rupture or the measure of the breaking strength and the maximum fiber stress at the point of failure of the pole in the 25-ft. poles tested, and he states that it seems logical to use the modulus of rupture for the following reasons:

1. Modulus of rupture is the maximum stress developed and it is manifestly unfair to have the strength of the pole represented by the lesser stress developed at the point of failure.

2. The point of failure cannot be definitely located and each of the possible locations of this point may give a different "maximum fiber stress at point of failure."

3. The test data are, of course, intended to form a basis for design, and in design the ground line or the point of one and one-half diameters is taken as the critical section. (In most cases the critical section is at the ground line because moisture and possible decay at this point are certain to reduce the strength below that of the upper part of the pole since the upper part is less affected by these factors.)

Species	Modulus of Rupture. Lbs. Per Sq. In.
Southern yellow pine (dense)	7,300
Douglas fir (dense)	7,300
Southern yellow pine (sound)	6,300
Douglas fir (not dense, Coast region)	6,300
Tamarack	6,000
Hemlock, western	5,600
Cypress, bald	5,600
Douglas fir (Rocky Mountain region)	5,300
Chestnut	4,600
Pine, lodgepole	4,500
Cedar, western red	4,300
Cedar, northern white	3,400
Spruce, Engelmann	3,400

Testing Poles by Means of Winch—Butts Supported and Load Applied at Top

4. In design or in comparing test results the side pull which the pole is able to withstand is the factor of most interest. If the modulus of rupture is known the side pull for a pole of any given dimensions can be readily computed. This cannot be done with "maximum fiber stress at point of failure" unless data are given or some assumption made as to the location of the "point of failure." The use of maximum fiber stress at point of failure combined with a correctly assumed location for the point of failure will lead to correct results but simplicity of computation is in favor of modulus of rupture.

Use of Results in Pole Design

It is probable that a pole in the line will, at points above the ground line, be capable of developing its air-dry strength (approximately 1½ times its strength when green) while at the ground line it will, because of absorption of moisture from the soil, develop only about the same strength as if green. If decay takes place this will also usually be at the ground line, making it certain that, in a large number of cases by far the weakest section of the pole will be that at the ground line. Consequently, the strength of green rather than that of dry or partially dry material should be the basis for computing allowable loads on poles.

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